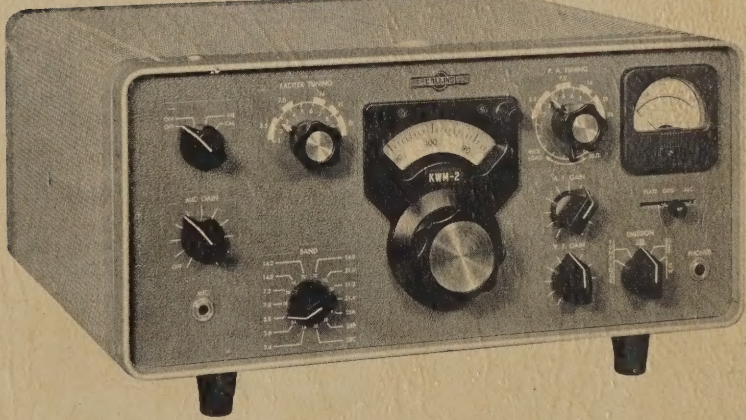
INSTRUCTION BOOK

TRANSCEIVER

KWM-2



COLLINS RADIO COMPANY

COLLINS

4 Rev. 2-52 (A)

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(b) Notice of the claimed defect is given Collins within 90 days from the date of purchase and goods are returned in accordance with Collins' instructions.

(c) Equipment, accessories, tubes, and batteries not manufactured by Collins or from Collins' designs are subject to only such adjustments as Collins may obtain from the supplier thereof.

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(C) Item or symbol number obtained from parts list or schematic
(D) Collins' type number, name, and serial number of principal equipment
(E) Unit sub-assembly number (where applicable)

INSTRUCTION BOOK

KWM-2
TRANSCEIVER

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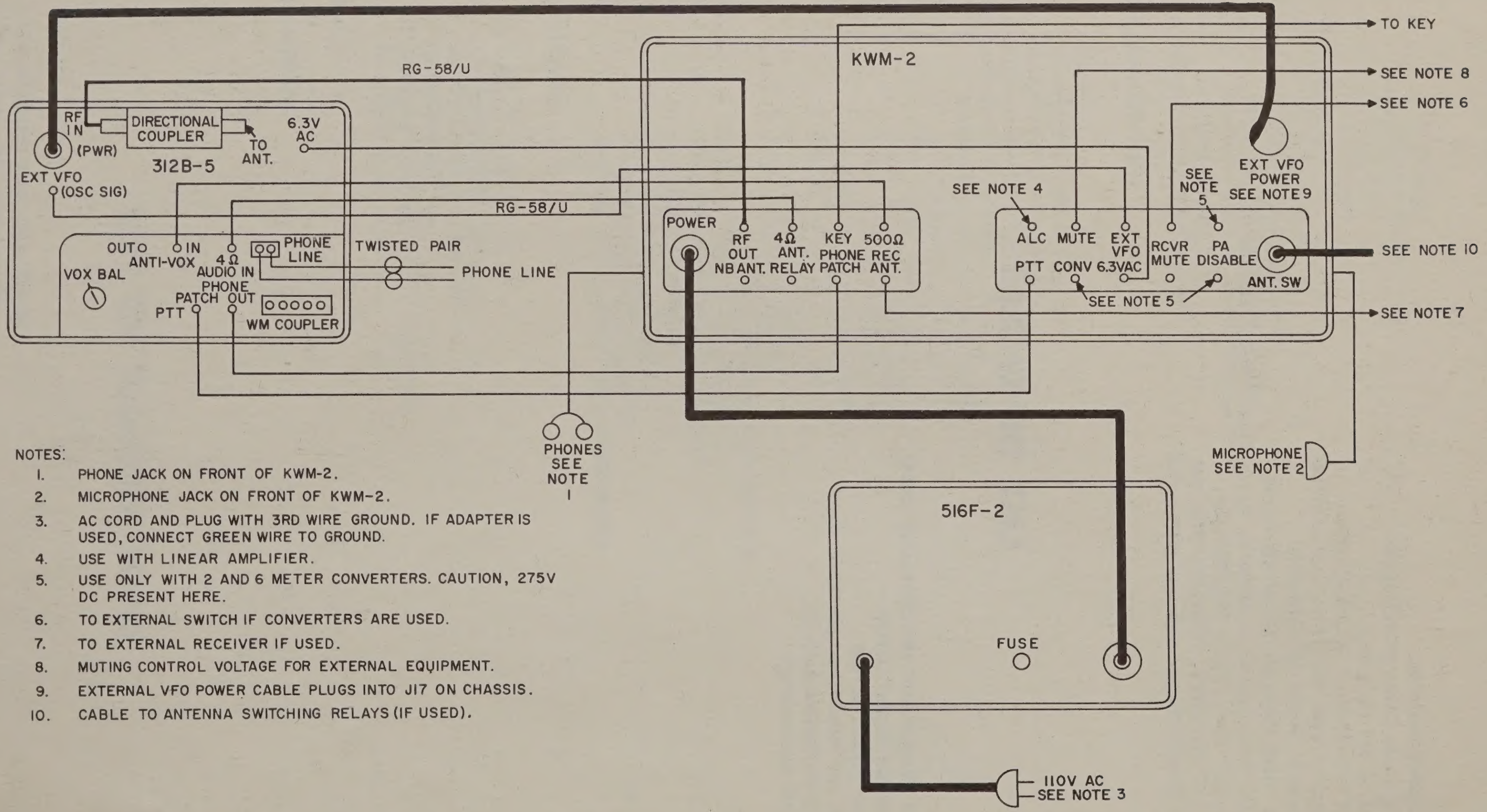


NOTES:

1. PHONE JACK ON FRONT OF KWM-2.
2. MICROPHONE JACK ON FRONT OF KWM-2.
3. AC CORD AND PLUG WITH 3RD WIRE GROUND. IF ADAPTER IS USED, CONNECT GREEN WIRE TO GROUND.
4. USE WITH LINEAR AMPLIFIER.
5. USE ONLY WITH 2 AND 6 METER CONVERTERS. CAUTION, 275V DC PRESENT HERE.
6. TO EXTERNAL SWITCH IF CONVERTERS ARE USED.
7. TO EXTERNAL RECEIVER IF USED.
8. MUTING CONTROL VOLTAGE FOR EXTERNAL EQUIPMENT.
9. EXTERNAL VFO POWER CABLE PLUGS INTO J17 ON CHASSIS.
10. CABLE TO ANTENNA SWITCHING RELAYS (IF USED).

Figure 1-1. KWM-2 Fixed Station Interconnections

SECTION I
INSTALLATION

1.1 UNPACKING.

Open carton carefully to avoid damaging transceiver. Carefully lift the transceiver out of the packing material. Examine for visible damage. If transceiver has been damaged in shipment, save box and packing material and notify the transportation company. Look for warranty card inside the unit. Fill out and mail the customer service card. Check that all tubes and crystals are properly seated in sockets. Check tuning controls and switches for freedom of action. Remove shipping blocks from 516F-2 Power Supply and plug in tubes.

1.2 MOUNTING AND CABLING.

1.2.1 GENERAL.

For fixed station installation, refer to figure 1-1 or 1-2. For mobile installation, refer to figure 1-3.

1.2.2 FIXED STATION INSTALLATION.

Connect associated equipment to the KWM-2 as shown in figure 1-1 or 1-2.

1.2.3 MOBILE INSTALLATION.

a. Select location in car, and mount KWM-2. Allow clearance on all sides to assure adequate ventilation. If vox operation is desired, leave enough space above the KWM-2 to allow opening the top cover for adjustment of VOX and ANTI-VOX gain controls, S-meter zero, etc. Drill holes and mount adapter bracket to transmission hump with self-tapping screws. Mount the 351D-2 Mobile Mount to the bracket. Swing the cantilever supports forward. Remove the plastic dust covers from the 351D-2 plugs, and store them in the recesses of the mount. Slide the KWM-2 onto the mount and push back until the mount plugs have entered the transceiver sockets. Tighten the wing nuts on the sides of the KWM-2. See 351D-2 Instruction Sheet for mobile mount installation.

b. Select location in car for mounting the 516E-1 Power Supply. This location must be as clean and dry as possible. Location in luggage compartment, under seat, or on passenger side of fire wall is satisfactory. DO NOT MOUNT IN ENGINE COMPARTMENT.

c. Determine necessary length of power cable (furnished with 351D-2 Mobile Mount) to connect the 516E-1 to the KWM-2, and cut to required length. Connect power supply, speaker, and microphone as shown in figure 1-3.

CAUTION

Be sure to observe correct polarity of car battery when making connections to the 12-volt terminals of power supply. DO NOT connect the 516E-1 Power Supply to a system which has a positive ground. To do so will destroy all six transistors in the power supply. A special power supply (part number 522 0846 025) is available for 12-volt positive ground operation.

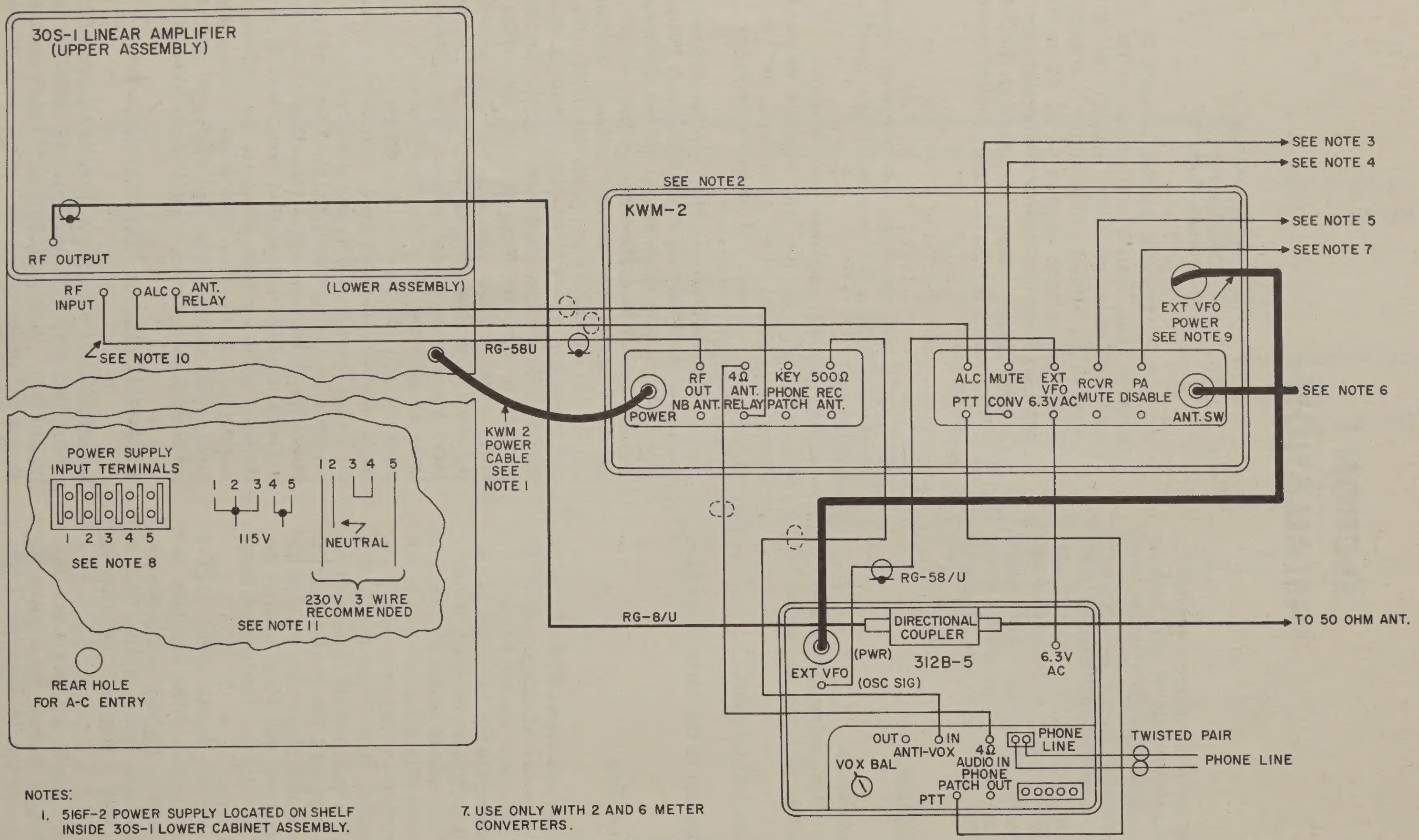
After the power cable and 12-volt power leads are connected, replace the terminal board cover on the power supply.

d. No mobile speaker is supplied. Connect the terminals of the car speaker as shown in figure 3. Break voice coil lead, and install a switch for transfer of speaker from car radio to KWM-2.

e. For suppression of noise encountered in mobile operation, the following suggestions may be helpful. Use resistor-type spark plugs, and install coaxial bypass capacitors at ignition coil, generator and voltage regulator leads. Use bracket-mounted coaxial capacitors in the battery and generator leads to the voltage regulator and a 0.005-microfarad (or smaller) disk ceramic or mica capacitor from the field lead to ground. If capacitor bypasses are not satisfactory here, remove them, and use chokes in series with the leads from field and armature terminals of generator. Place these chokes as close to the voltage regulator as possible. For the field lead choke, wind 12 turns of no. 18 wire on a 1/4-inch powdered iron core. For the armature lead, wind 12 turns of no. 14 or larger wire on a 1/4-inch powdered iron core. If bypass capacitor is used from field lead (to regulator) to ground, do not use larger value than 0.005 uf unless a 4-ohm resistor is placed in series with it. Ground the rear end of the exhaust pipe to the car body, using copper braid. General information concerning the problem of ignition noise and suggested methods of noise suppression are available in current handbooks.

1.3 INITIAL CHECKS. (Refer to figure 2-1.)

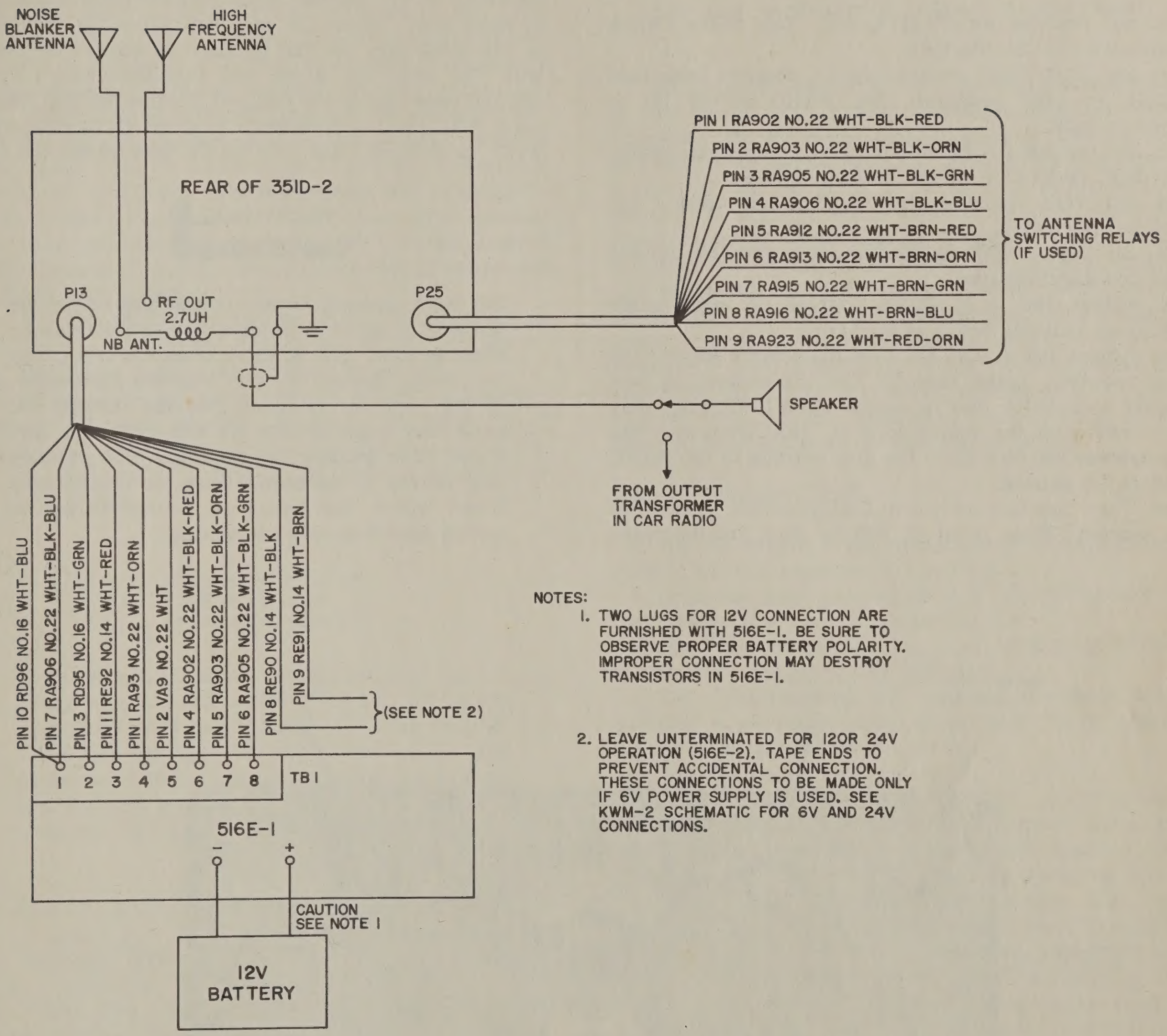
Set MIC GAIN control (4) full counterclockwise, meter switch (8) to PLATE position, and EMISSION switch (2) to LOCK. Read the no-signal PA plate current. It should be approximately 40 ma. If plate current is other than 40 ma, adjust BIAS ADJUST potentiometer on power supply chassis to set plate current at 40 ma.



NOTES:

1. 516F-2 POWER SUPPLY LOCATED ON SHELF INSIDE 30S-1 LOWER CABINET ASSEMBLY.
2. CONNECT HEADPHONES TO PHONE JACK ON FRONT OF KWM-2. CONNECT MICROPHONE TO MIC JACK ON FRONT OF KWM-2.
3. USE ONLY WITH 2 AND 6 METER CONVERTERS. (CAUTION +275V DC PRESENT HERE)
4. TO EXTERNAL SWITCH IF CONVERTERS ARE HERE.
5. TO EXTERNAL RECEIVER, IF USED.
6. CABLE TO ANTENNA SWITCHING RELAYS. (IF USED)
7. USE ONLY WITH 2 AND 6 METER CONVERTERS.
8. CONNECTIONS AS SEEN THROUGH FRONT DOOR ON LOWER ASSEMBLY.
9. EXTERNAL VFO POWER CABLE PLUGS INTO J17 ON CHASSIS.
10. THIS CABLE IS FURNISHED WITH 30S-1 IN 20.5 FT LENGTH. DO NOT CUT.
11. 10 FT LENGTH OF 3 WIRE (EACH NO. 12) CONDUCTOR WITH LUGS ON ONE END. CONNECT OTHER END TO SWITCHBOX OR PLUG AS DESIRED.

Figure 1-2. High-Power Station Interconnections


NOISE BLANKER ANTENNA
HIGH FREQUENCY ANTENNA
REAR OF 351D-2
P13
RF OUT
2.7UH
NB ANT.
P25
PIN 1 RA902 NO.22 WHT-BLK-RED
PIN 2 RA903 NO.22 WHT-BLK-ORN
PIN 3 RA905 NO.22 WHT-BLK-GRN
PIN 4 RA906 NO.22 WHT-BLK-BLU
PIN 5 RA912 NO.22 WHT-BRN-RED
PIN 6 RA913 NO.22 WHT-BRN-ORN
PIN 7 RA915 NO.22 WHT-BRN-GRN
PIN 8 RA916 NO.22 WHT-BRN-BLU
PIN 9 RA923 NO.22 WHT-RED-ORN
TO ANTENNA SWITCHING RELAYS (IF USED)
SPEAKER
FROM OUTPUT TRANSFORMER IN CAR RADIO
PIN 10 RD96 NO.16 WHT-BLU
PIN 7 RA906 NO.22 WHT-BLK-BLU
PIN 3 RD95 NO.16 WHT-GRN
PIN 11 RE92 NO.14 WHT-RED
PIN 1 RA93 NO.22 WHT-ORN
PIN 2 VA9 NO.22 WHT
PIN 4 RA902 NO.22 WHT-BLK-RED
PIN 5 RA903 NO.22 WHT-BLK-ORN
PIN 6 RA905 NO.22 WHT-BLK-GRN
PIN 8 RE90 NO.14 WHT-BLK
PIN 9 RE91 NO.14 WHT-BRN
(SEE NOTE 2)
1
2
3
4
5
6
7
8
TB 1
516E-1
-
+
CAUTION SEE NOTE 1
12V BATTERY

NOTES:

1. TWO LUGS FOR 12V CONNECTION ARE FURNISHED WITH 516E-1. BE SURE TO OBSERVE PROPER BATTERY POLARITY. IMPROPER CONNECTION MAY DESTROY TRANSISTORS IN 516E-1.
2. LEAVE UNTERMINATED FOR 12OR 24V OPERATION (516E-2). TAPE ENDS TO PREVENT ACCIDENTAL CONNECTION. THESE CONNECTIONS TO BE MADE ONLY IF 6V POWER SUPPLY IS USED. SEE KWM-2 SCHEMATIC FOR 6V AND 24V CONNECTIONS.

Figure 1-3. Mobile Station Interconnections

SECTION II
OPERATION

2.1 RECEIVER TUNING.

a. Set function switch (1) to ON. This is the switch labeled OFF-ON-NB-CAL.

b. Set EMISSION switch (2) to desired sideband (USB or LSB position). Set BAND switch (3) to desired band.

c. Set the MIC GAIN control (4) full counterclockwise. Set R.F. GAIN control (10) full clockwise.

d. Set VOX GAIN control (under top cover) full counterclockwise.

e. Set ANTI VOX GAIN control (under top cover) full counterclockwise.

f. Adjust the A.F. GAIN control (5) until some receiver noise is heard in speaker.

g. Adjust the EXCITER TUNING control (6) to peak the receiver noise output. The transceiver is now ready to receive and the selected 200-kc band may be tuned with the tuning control. Dial frequency can be determined by adding the dial reading to the BAND switch (3) setting.

h. Turn function switch to CAL position. Tune dial to nearest 100-kc point (0, 100, or 200), and decrease R.F. GAIN control (10) as necessary for comfortable listening level. Adjust tuning until the calibrate signal is zero beat. When the calibrate signal is zero beat in the receiver, set the hairline on the 100-kc mark with the zero set knob. Set function switch (1) to ON and tune dial to the desired portion of the 200-kc band selected. If checking calibrate circuit against WWV is desired, see section IV, paragraph 4.5.2.3.

WARNING

DO NOT operate transmit circuits while the KWM-2 is tuned to receive outside the amateur band in use. The KWM-2 transmit frequency is always locked to the receive frequency. If the receiver is tuned into the foreign DX band and push-to-talk or vox action is initiated (with modulation) the transmit frequency will be out of the band. Keep the transceiver tuned within the band, or return tuning to within band before transmitting.

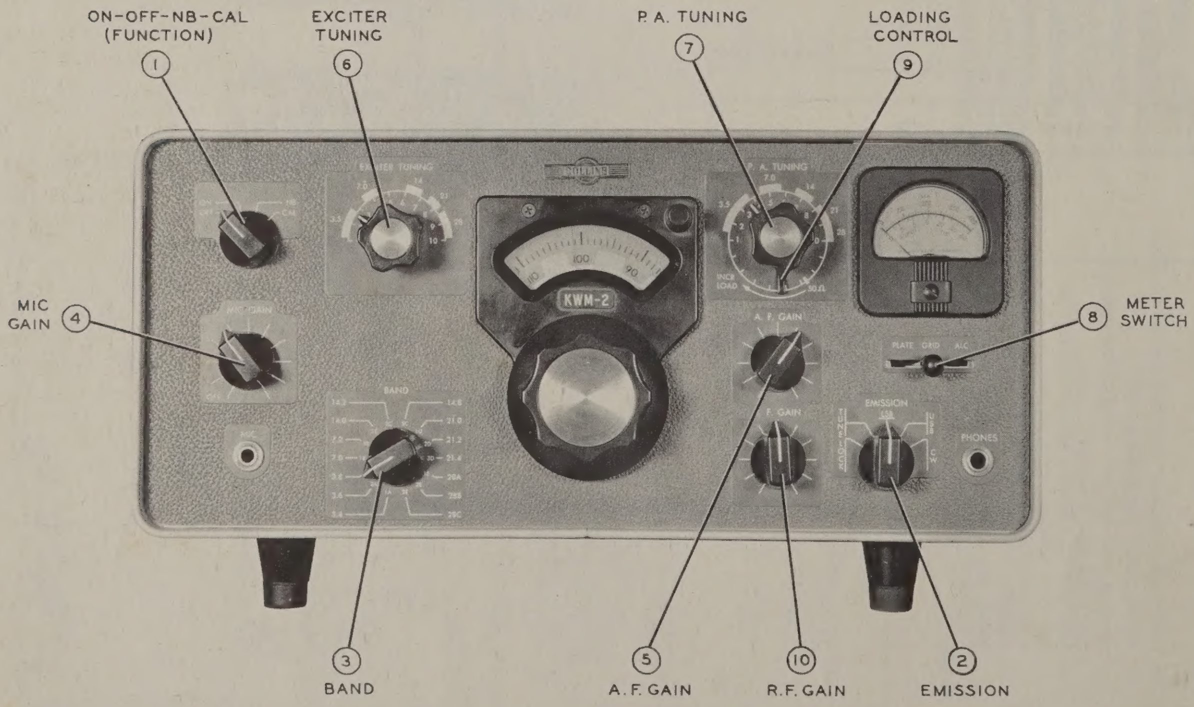


Figure 2-1. Front Panel Controls

2.2 TRANSMITTING TUNING.

2.2.1 GENERAL.

a. Set up for receive function as in paragraph 2.1.
b. Set EMISSION switch (2) to TUNE position. Set P.A. TUNING control (7) to white portion of dial indicating the desired band.
c. Set meter switch (8) to PLATE position. Advance the MIC GAIN control (4) full clockwise, and rock the EXCITER TUNING control (6) until maximum plate current is obtained. Dip the plate current immediately with the P.A. TUNING control (7), and return the MIC GAIN control (4) to full counterclockwise position.
d. Set the meter switch (8) to GRID position. Advance MIC GAIN control (4) until grid current is obtained. Rock the EXCITER TUNING control (6) to obtain a peak in grid current indication. ~~After grid current has been peaked with the EXCITER TUNING control (6), adjust MIC GAIN control (4) to set grid current to full scale on meter.~~
e. Set the EMISSION switch (2) to LOCK position.
f. Adjust MIC GAIN setting (4) to 3/4 full scale.
g. Set meter switch (8) to PLATE position.
h. Alternately dip plate current with P.A. TUNING control (7), and increase loading with INCR LOAD control (9) until plate current is 230 ma at the dip.
i. Set EMISSION switch (2) to desired sideband or to CW position.

CAUTION

If transceiver frequency is changed by any great amount, be sure to redip the power amplifier plate current and check the loading. This will be most important on the 80- and 40-meter bands. Some operating experience will indicate the amount of frequency excursion possible without readjustment.

2.2.2 SINGLE-SIDEBAND OPERATION.

a. Set up receiver operation and transmitter operation completely as in paragraphs 2.1 and 2.2.1.
b. Close-talk into the microphone, increasing VOX GAIN control setting until vox relay just operates. For vox operation, it is desirable to close-talk the microphone to prevent background noises from tripping the KWM-2 into transmit function.
c. Set meter switch (8) to ALC position. Increase setting of MIC GAIN control (4) to obtain S6 average reading on voice.
d. Leave MIC GAIN control (4) as set in step c above. Leave microphone in normal operating position. Set function switch to CAL position, tune in calibrate signal, and adjust A.F. GAIN control (5) for comfortable listening level.
e. Adjust the tuning control for approximately 1000-cps beat note. If the vox relay trips, increase ANTI VOX GAIN setting to minimum point necessary to prevent speaker output from tripping vox. It may be necessary to increase VOX GAIN setting slightly after this anti vox gain adjustment in order to compensate for the anti vox gain.

NOTE

Do not use more vox gain nor more anti vox gain than necessary to control vox operation.

f. Set function switch to ON position. The KWM-2 is now ready for transmit operation in SSB service. Speaking into the microphone transfers from receive function to transmit function through the vox circuit action. If the receiver is tuned to a different frequency, the transmitter is tuned to the new frequency. After changing frequency on the lower bands (3.4 to 4.0 mc), switch EMISSION switch (2) to LOCK position and make the following checks: Switch meter switch (8) to GRID position, and rock the EXCITER TUNING control (6) gently to check that PA grid drive current is peaked. Switch the meter switch (8) to PLATE, and check the dip in PA plate current with the P.A. TUNING control (7). Set the EMISSION switch back to the desired sideband position and make the call.

2.2.3 CW OPERATION.

a. Set up receiver and transmitter operation completely as in paragraphs 2.1 and 2.2.1.
b. Depress key and adjust A.F. GAIN control (5) for comfortable monitoring level.
c. Hold key down, and increase VOX GAIN control setting until the vox relay operates.
d. Set meter switch (8) to ALC position. While sending a series of dots, adjust MIC GAIN control (4) for S2 meter indication of alc.
e. Set the function switch to ON.
f. When receiving, leave the A.F. GAIN control (5) set for comfortable monitoring level, and adjust the receive level with the R.F. GAIN control (10). When the KWM-2 is receiving, the received signal is indicated in S units. The S-meter will read correctly with the R.F. GAIN (10) at less than maximum setting, provided the received signal level is high enough to kick the S-meter. For example, if the R.F. GAIN control (10) is set for no-signal reading of S8 and kicks to S9 with signal, the received signal is S9.

NOTE

The CW output signal frequency is 1350 cps higher than the dial reading.

2.2.4 MOBILE OPERATION.

The vox and anti vox circuits will operate in mobile operation, but push-to-talk operation is recommended, since high-level background noises will produce

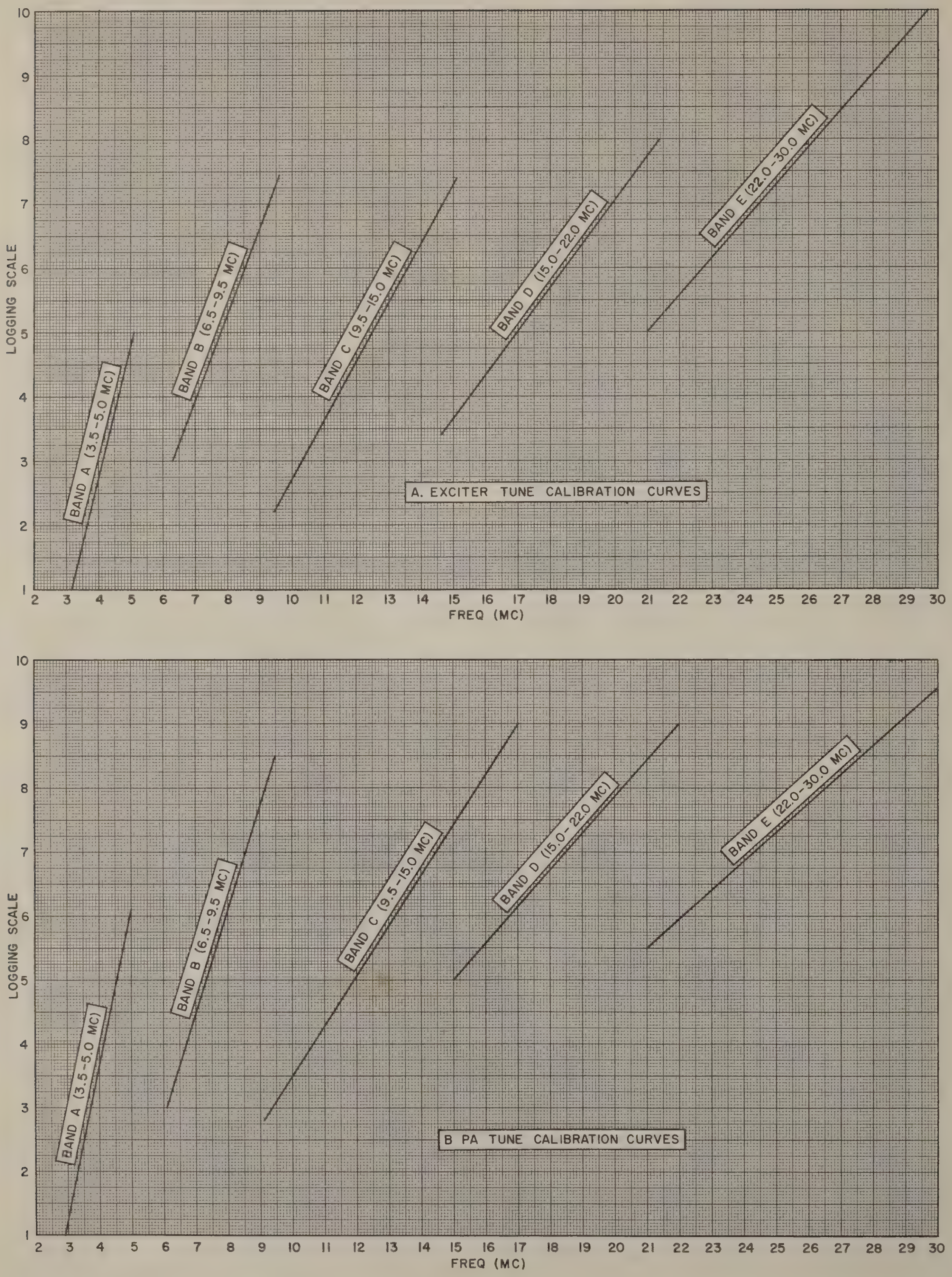


Figure 2-2. Logging Scale Calibration Curves

undesirable vox switchover. Set VOX GAIN and ANTI-VOX GAIN controls full counterclockwise before installation. If vox operation is desired, leave clearance in installation so top cover can be opened. For mobile operation, load the power amplifier to 210 ma plate current.

2.3 OPERATION OUTSIDE AMATEUR BANDS.

All amateur bands are completely covered except the 10-meter band for which only one crystal is furnished (for 28.5 to 28.7 mc). Two extra sockets are provided for additional crystals in the 10-meter band.

The transmitter can be operated at other frequencies outside the specified amateur bands (MARS frequencies) or at other 10-meter frequencies by plugging the proper crystals into the mounting board. Operation at frequencies outside the amateur bands will result in slightly decreased receiver sensitivity and transmitter PA grid drive, unless the tuned circuits of the transceiver are retuned to peak their responses in the desired portions of the high-frequency spectrum. For operation outside amateur bands, disregard the amateur band markings on the EXCITER TUNING and P.A. TUNING scales and use the logging scales. Figure 2-2 shows logging scale calibration curves, and figure 2-3 shows crystal socket locations. Select these crystals as follows:

a. If the lower edge of the desired 200-kc band is less than 11.8 mc, the required frequency is equal to the lower edge of the desired band plus 3.155 mc. As an example, if the desired band is 4.0 to 4.2 mc, 4.0 mc plus 3.155 mc equals 7.155 mc.

b. If the lower edge of the desired 200-kc band is 12.00 mc or higher, the required crystal frequency is half the sum of the lower edge of the desired band and 3.155 mc. As an example, if the desired band is 14.4 to 14.6 mc,

$$\frac{14.4 + 3.155}{2} = 8.7775 \text{ mc.}$$

The plate circuit of the oscillator is tuned to twice the crystal frequency when required injection frequencies are this high.

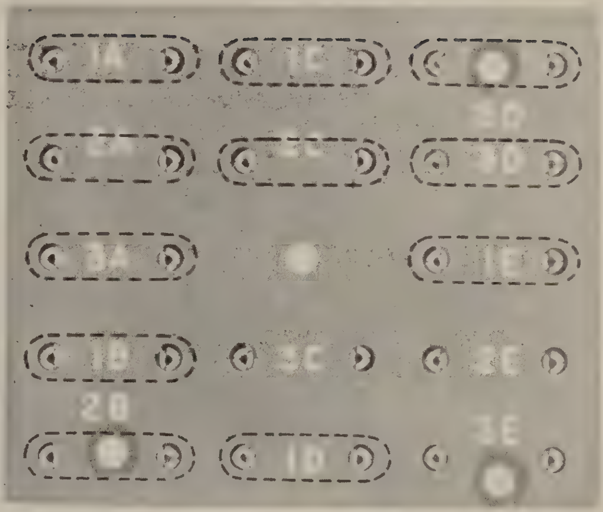


Figure 2-3. Crystal Socket Locations

CAUTION

Avoid transmitter operation between 5.0 and 6.5 mc. In this range, the second harmonic of the variable i-f frequency is nearly the same as desired frequency. In transmit function, some of this energy will pass through the tuned circuits and become spurious emission.

c. Substitute or extra crystals should be plugged into the appropriate socket on the mounting board according to the best location in one of the five bands. The example cited, in step b above, should place the crystal in one of the sockets marked C. If two additional 10-meter crystals are used, they should be plugged into the sockets marked E. Table 2-1 lists crystal socket designations, switch positions (BAND), crystal frequencies furnished, and frequency range limitations. For extra coverage crystals available, see section VI, Parts List.

TABLE 2-1. CRYSTAL FREQUENCIES AND OPERATING BANDS

BAND-SWITCH POSITION	FREQUENCY BAND	CRYSTAL SUPPLIED	CRYSTAL SOCKET CONNECTED	TOTAL COVERAGE
1A - 3.4	3.4 - 3.6 mc	6.555 mc	1A	A 3.4 - 5.0 mc
2A - 3.6	3.6 - 3.8 mc	6.7555 mc	2A	
3A - 3.8	3.8 - 4.0 mc	6.955 mc	3A	
1B - 7.0	7.0 - 7.2 mc	10.155 mc	1B	B 6.5 - 9.5 mc
2B - 7.2	7.2 - 7.4 mc	10.355 mc	2B	

TABLE 2-1. CRYSTAL FREQUENCIES AND OPERATING BANDS (Cont)

BAND-SWITCH POSITION	FREQUENCY BAND	CRYSTAL SUPPLIED	CRYSTAL SOCKET CONNECTED	TOTAL COVERAGE
1C - 14.0	14.0 - 14.2 mc	8.5775 mc	1C	
2C - 14.2	14.2 - 14.4 mc	8.6775 mc	2C	C 9.5 - 15.0 mc
3C - 14.8	14.8 - 15.0 mc	8.9775 mc	3C	
1D - 21.0	21.0 - 21.2 mc	12.0775 mc	1D	
2D - 21.2	21.2 - 21.4 mc	12.1775 mc	2D	D 15.0 - 22.0 mc
3D - 21.4	21.4 - 21.6 mc	12.2775 mc	3D	
1E - 28A	28.5 - 28.7 mc	15.8725 mc	1E	
2E - 28B	As selected	Not furnished	2E	E 22.0 - 30.0 mc
3E - 28C	As selected	Not furnished	3E	

SECTION III
PRINCIPLES OF OPERATION

3.1 BLOCK DIAGRAM.

Refer to figure 3-1. The KWM-2 is an SSB or CW transceiver operating in the range between 3.4 and 30.0 mc. It consists of a double-conversion receiver and a double-conversion exciter-transmitter. The transmitter and receiver circuits use common oscillators, common mechanical filter, and common r-f amplifier. The transmitter low-frequency i-f and the receiver low-frequency i-f is 455 kc. The high-frequency i-f for both is 2.955 to 3.155 mc. This is a band-pass i-f which accommodates the full 200-kc bandwidth. Figure 7-1 is a schematic diagram of the KWM-2, and figure 7-2 is a schematic diagram of the 516F-2 Power Supply.

3.2 TRANSMITTER CIRCUITS.

3.2.1 A-F CIRCUITS.

Microphone or phone-patch input is connected to the grid of the first audio amplifier V1A, amplified, and coupled to the grid of the second audio amplifier, V11B. Output from V11B is coupled to the grid of cathode follower V3A through the MIC GAIN control, R8. Output from the cathode follower is fed to the resistive balance point of the balanced modulator. In TUNE, LOCK, and CW positions of the EMISSION switch, output from the tone oscillator, V2B, is fed to the grid of the second audio amplifier. Amplifier tone oscillator signal is taken from the plate of V11B to the grid of the vox amplifier to activate the vox circuits in CW operation. This signal is also fed to the grid of the first receiver a-f amplifier, V16A, for CW monitoring.

3.2.2 BALANCED MODULATOR AND LOW-FREQUENCY I-F CIRCUITS.

Audio output from the cathode of V3A and the bfo voltage are fed to the wiper of the carrier balance potentiometer, R15. Both upper and lower sideband outputs from the balanced modulator are coupled through i-f transformer T1 to the grid of the i-f amplifier, V4A. Output from the i-f amplifier is fed to the mechanical filter, FL1. The pass band of FL1 is centered at 455 kc. This passes either upper or lower sideband, depending upon the sideband polarity selected when the EMISSION switch connects bfo crystal Y16 or Y17. The signal-sideband output of FL1 is connected to the grids of the first transmitter mixer in push pull.

3.2.3 BALANCED MIXERS.

The 455-kc single-sideband signal is fed to the first balanced mixer grids in push pull. The plates of the mixer are connected in push pull, and vfo signal is fed to the two grids in parallel. The mixer cancels the vfo signal energy and translates the 455-kc single-sideband signal to a 2.955- to 3.155-mc single-sideband signal. The coupling network between the plates of the first mixer and the grid of the second balanced mixer is broadbanded to provide a uniform response to the band-pass i-f frequency. The transmit frequency is determined within the pass band by the vfo frequency. The band-pass i-f signal is fed to one of the grids of the second balanced mixer, and the high-frequency injection signal energy from crystal oscillator V13A is fed to the signal input cathode and to the other grid. This arrangement

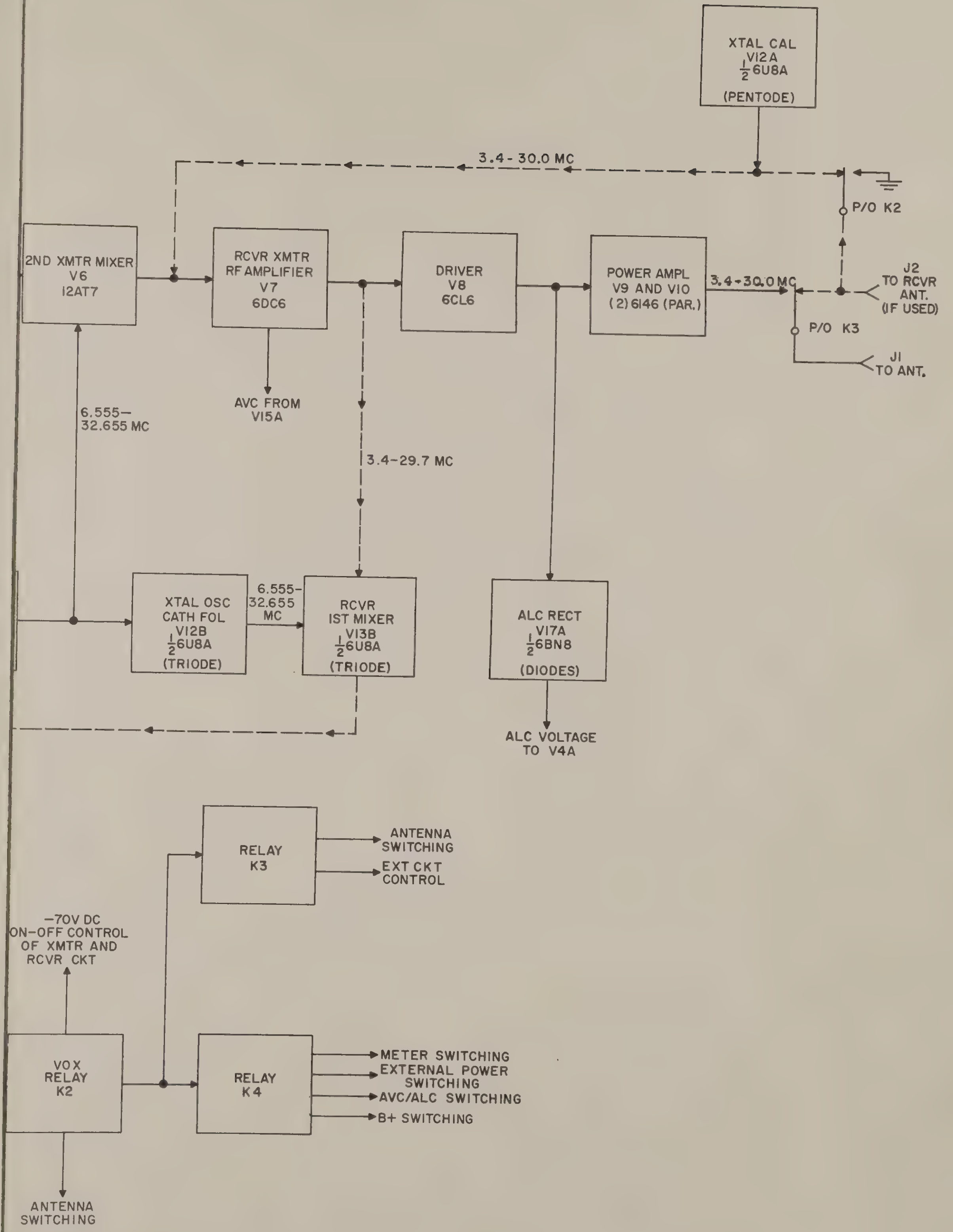


Figure 3-1. KWM-2 Transceiver, Block Diagram

TABLE 2-1. CRYSTAL FREQUENCIES AND OPERATING BANDS (Cont)

BAND-SWITCH POSITION	FREQUENCY BAND	CRYSTAL SUPPLIED	CRYSTAL SOCKET CONNECTED	TOTAL COVERAGE
1C - 14.0	14.0 - 14.2 mc	8.5775 mc	1C	
2C - 14.2	14.2 - 14.4 mc	8.6775 mc	2C	C 9.5 - 15.0 mc
3C - 14.8	14.8 - 15.0 mc	8.9775 mc	3C	
1D - 21.0	21.0 - 21.2 mc	12.0775 mc	1D	
2D - 21.2	21.2 - 21.4 mc	12.1775 mc	2D	D 15.0 - 22.0 mc
3D - 21.4	21.4 - 21.6 mc	12.2775 mc	3D	
1E - 28A	28.5 - 28.7 mc	15.8725 mc	1E	
2E - 28B	As selected	Not furnished	2E	E 22.0 - 30.0 mc
3E - 28C	As selected	Not furnished	3E	

SECTION III
PRINCIPLES OF OPERATION

3.1 BLOCK DIAGRAM.

Refer to figure 3-1. The KWM-2 is an SSB or CW transceiver operating in the range between 3.4 and 30.0 mc. It consists of a double-conversion receiver and a double-conversion exciter-transmitter. The transmitter and receiver circuits use common oscillators, common mechanical filter, and common r-f amplifier. The transmitter low-frequency i-f and the receiver low-frequency i-f is 455 kc. The high-frequency i-f for both is 2.955 to 3.155 mc. This is a band-pass i-f which accommodates the full 200-kc bandwidth. Figure 7-1 is a schematic diagram of the KWM-2, and figure 7-2 is a schematic diagram of the 516F-2 Power Supply.

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3.2.1 A-F CIRCUITS.

Microphone or phone-patch input is connected to the grid of the first audio amplifier V1A, amplified, and coupled to the grid of the second audio amplifier, V11B. Output from V11B is coupled to the grid of cathode follower V3A through the MIC GAIN control, R8. Output from the cathode follower is fed to the resistive balance point of the balanced modulator. In TUNE, LOCK, and CW positions of the EMISSION switch, output from the tone oscillator, V2B, is fed to the grid of the second audio amplifier. Amplifier tone oscillator signal is taken from the plate of V11B to the grid of the vox amplifier to activate the vox circuits in CW operation. This signal is also fed to the grid of the first receiver a-f amplifier, V16A, for CW monitoring.

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Audio output from the cathode of V3A and the bfo voltage are fed to the wiper of the carrier balance potentiometer, R15. Both upper and lower sideband outputs from the balanced modulator are coupled through i-f transformer T1 to the grid of the i-f amplifier, V4A. Output from the i-f amplifier is fed to the mechanical filter, FL1. The pass band of FL1 is centered at 455 kc. This passes either upper or lower sideband, depending upon the sideband polarity selected when the EMISSION switch connects bfo crystal Y16 or Y17. The signal-sideband output of FL1 is connected to the grids of the first transmitter mixer in push pull.

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The 455-kc single-sideband signal is fed to the first balanced mixer grids in push pull. The plates of the mixer are connected in push pull, and vfo signal is fed to the two grids in parallel. The mixer cancels the vfo signal energy and translates the 455-kc single-sideband signal to a 2.955- to 3.155-mc single-sideband signal. The coupling network between the plates of the first mixer and the grid of the second balanced mixer is broadbanded to provide a uniform response to the band-pass i-f frequency. The transmit frequency is determined within the pass band by the vfo frequency. The band-pass i-f signal is fed to one of the grids of the second balanced mixer, and the high-frequency injection signal energy from crystal oscillator V13A is fed to the signal input cathode and to the other grid. This arrangement

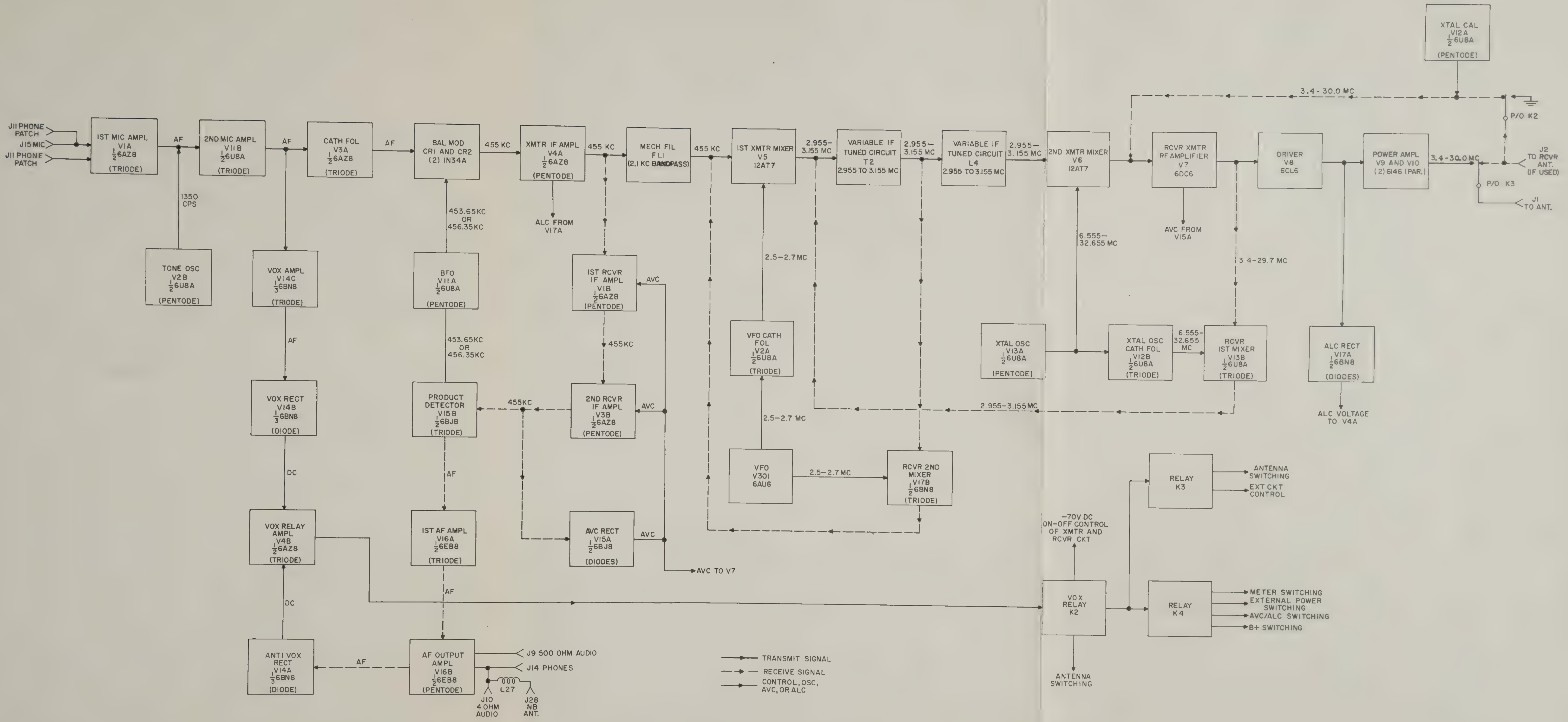

J11 PHONE PATCH
J15 MIC
J11 PHONE PATCH
1ST MIC AMPL V1A ½6AZ8 (TRIODE)
AF
2ND MIC AMPL V11B ½6U8A (TRIODE)
AF
CATH FOL V3A ½6AZ8 (TRIODE)
AF
BAL MOD CR1 AND CR2 (2) 1N34A
455 KC
XMTR IF AMPL V4A ½6AZ8 (PENTODE)
455 KC
MECH FIL FL1 (2.1 KC BANDPASS)
455 KC
1ST XMTR MIXER V5 12AT7
2.955-3.155 MC
VARIABLE IF TUNED CIRCUIT T2 2.955 TO 3.155 MC
2.955-3.155 MC
VARIABLE IF TUNED CIRCUIT L4 2.955 TO 3.155 MC
2.955-3.155 MC
2ND XMTR MIXER V6 12AT7
RCVR XMTR RF AMPLIFIER V7 6DC6
DRIVER V8 6CL6
POWER AMPL V9 AND V10 (2) 6146 (PAR.)
3.4-30.0 MC
XTAL CAL V12A ½6U8A (PENTODE)
3.4 - 30.0 MC
P/O K2
J2 TO RCVR ANT. (IF USED)
P/O K3
J1 TO ANT.
1350 CPS
TONE OSC V2B ½6U8A (PENTODE)
VOX AMPL V14C ⅓6BN8 (TRIODE)
AF
453.65KC OR 456.35KC
BFO V11A ½6U8A (PENTODE)
453.65KC OR 456.35KC
ALC FROM V17A
1ST RCVR IF AMPL V1B ½6AZ8 (PENTODE)
AVC
455KC
2.5-2.7 MC
VFO CATH FOL V2A ½6U8A (TRIODE)
2.5-2.7 MC
6.555-32.655 MC
AVC FROM V15A
3 4-29.7 MC
XTAL OSC V13A ½6U8A (PENTODE)
XTAL OSC CATH FOL V12B ½6U8A (TRIODE)
6.555-32.655 MC
RCVR 1ST MIXER V13B ½6U8A (TRIODE)
ALC RECT V17A ½6BN8 (DIODES)
ALC VOLTAGE TO V4A
2.955-3.155 MC
VOX RECT V14B ⅓6BN8 (DIODE)
PRODUCT DETECTOR V15B ½6BJ8 (TRIODE)
455KC
2ND RCVR IF AMPL V3B ½6AZ8 (PENTODE)
AVC
DC
AF
VFO V301 6AU6
2.5-2.7 MC
RCVR 2ND MIXER V17B ½6BN8 (TRIODE)
RELAY K3
ANTENNA SWITCHING
EXT CKT CONTROL
VOX RELAY AMPL V4B ½6AZ8 (TRIODE)
1ST AF AMPL V16A ½6EB8 (TRIODE)
AVC RECT V15A ½6BJ8 (DIODES)
AVC
AVC TO V7
-70V DC ON-OFF CONTROL OF XMTR AND RCVR CKT
DC
AF
VOX RELAY K2
RELAY K4
METER SWITCHING
EXTERNAL POWER SWITCHING
AVC/ALC SWITCHING
B+ SWITCHING
ANTI VOX RECT V14A ⅓6BN8 (DIODE)
AF
AF OUTPUT AMPL V16B ½6EB8 (PENTODE)
J9 500 OHM AUDIO
J14 PHONES
L27
J10 4 OHM AUDIO
J28 NB ANT.
TRANSMIT SIGNAL
RECEIVE SIGNAL
CONTROL, OSC, AVC, OR ALC
ANTENNA SWITCHING

Figure 3-1. KWM-2 Transceiver, Block Diagram

cancels the high-frequency injection signal energy within the mixer and translates the band-pass i-f signal to the desired operating band.

3.2.4 R-F CIRCUITS.

The slug-tuned circuits coupling V6 to V7, V7 to V8, and V8 to the power amplifier are ganged to the EXCITER TUNING control. The signal is amplified by the r-f amplifier, V7, and the driver, V8, to drive the power amplifier, V9 and V10. Output from the parallel power amplifiers is tuned by a pi-network and fed to the antenna through contacts of transmit-receive relay K3. Negative r-f feedback from the PA plate circuit to the driver cathode circuit permits a high degree of linearity at the high power level of the PA tubes. Both the driver and PA stages are neutralized to ensure stability. On signal peaks, the detected envelope from the PA grids is rectified by the alc rectifier, V17A. D-c output from V17A is filtered and used to control the gain of V4A and V7. This prevents overdriving the power amplifier.

3.3 RECEIVER CIRCUITS.

3.3.1 R-F CIRCUITS.

Signal input from the antenna is connected through relay contacts to the tuned input circuit, T3. The signal is applied from T3 to the grid of the receiver-transmitter r-f amplifier, V7. Amplified signal from V7 is applied from the tuned circuit consisting of L10 and band-switch-selected capacitors to the grid of the receiver first mixer, V13B.

3.3.2 RECEIVER MIXERS.

The input r-f signal is fed to the grid of V13B, and the high-frequency oscillator injection signal is fed to the cathode of V13B. The difference product of the first mixer is applied from the plate of the tube to variable i-f transformer T2. Output of T2 in the range of 2.955 to 3.155 megacycles is applied to the grid of the second receiver mixer, V17B, across parallel-tuned trap circuit Z5. This trap circuit minimizes a spurious response which would otherwise result from harmonics of the high-frequency crystal oscillator. When signal input is applied to the grid of V17B and vfo injection signal is applied to the cathode of V17B, the 455-kc difference product is fed from V17B plate to mechanical filter FL1.

3.3.3 I-F CIRCUITS.

The output from FL1 is applied to the grid of the first i-f amplifier, V1B. The i-f signal is amplified by V1B and V3B and applied through T5 to avc rectifier V15A and the grid of product detector V15B. Beat-frequency oscillator signal is applied to the cathode of V15B, and the product of mixing is the detected audio signal. Output of the avc rectifier circuit is applied to the two receiver i-f amplifiers and through contacts of relay K4 to the receiver-transmitter r-f amplifier. This avc voltage controls the gain of the receiver and prevents overloading.

3.3.4 A-F CIRCUITS.

Output from the product detector is applied through the A.F. GAIN control, R92, to the grid of the first a-f amplifier, V16A. Amplified audio output of V16A is coupled to the grid of the a-f output amplifier, V16B, which produces the power to operate speaker, headphones, or phone patch.

3.4 OSCILLATORS.

The transceiver contains five oscillators. They are the tone oscillator, the beat-frequency oscillator, the variable-frequency oscillator, the high-frequency crystal oscillator, and the crystal calibrator.

3.4.1 TONE OSCILLATOR.

The tone oscillator operates when the EMISSION switch is in LOCK, TUNE, or CW position. It is a phase-shift oscillator operating at approximately 1350 cps. Its output is fed to the transmitter audio circuits for tuneup signal and to the balanced modulator to produce a carrier frequency 1350 cps removed from the dial reading. This signal allows carrier to be applied to the power amplifier grids for CW or tuneup. Some of the output from the tone oscillator is applied to the receiver audio circuits for sidetone monitoring in CW operation.

3.4.2 BEAT-FREQUENCY OSCILLATOR.

The bfo is crystal controlled at either 453.650 or 456.350 kilocycles, depending upon whether Y16 or Y17 is selected by the EMISSION switch section S9H. The unused crystal is shorted out by this switch section. These crystal frequencies are matched to the pass band of the mechanical filter, FL1, so that the carrier frequency is placed approximately 20 db down on the skirts of the filter response. This 20-db carrier attenuation is in addition to the 30-db suppression provided by the balanced modulator.

3.4.3 VARIABLE-FREQUENCY OSCILLATOR.

The vfo operates in the range of 2.5 to 2.7 mc. The value of the cathode choke is selected so that switching a small trimmer across it shifts the oscillator frequency. This compensates for switching bfo frequency and keeps dial calibration accurate, no matter which sideband is selected. This bfo switching is done by applying a positive or negative bias to diode CR301. When the diode bias is positive, the diode impedance is lowered, and C308 is effectively in parallel with L304. When the bias is negative, diode impedance is high, and C308 is effectively switched out of the circuit.

3.4.4 HIGH-FREQUENCY CRYSTAL OSCILLATOR.

The high-frequency crystal oscillator, V13A, is crystal controlled by one of 14 crystals selected by BAND switch S2. Output from the high-frequency crystal oscillator is fed to the transmitter second mixer and to the crystal oscillator cathode follower. The cathode follower provides isolation and impedance match between the crystal oscillator and the receiver first mixer cathode. The output frequency of this oscillator is always 3.155 mc higher than the lower edge of the desired band. This high-frequency injection signal is the crystal fundamental frequency for all desired signals below 12 megacycles, but for operating frequencies higher than 12 mc, the crystal frequency is doubled in the plate circuit of the oscillator. Instructions for calculating crystal frequencies for the desired bands are given in section II.

3.4.5 CRYSTAL CALIBRATOR.

The 100-kc crystal calibrator, V12A, is the pentode section of a type 6U8A tube. Its output is coupled to the antenna coil, T3. The calibrator may be trimmed to zero beat with WWV (or any other desired frequency standard) by adjustment of capacitor C76.

3.5 VOX AND ANTI VOX CIRCUITS.

Audio output voltage from the second microphone amplifier, V11B, is coupled to the VOX GAIN control. R39. A portion of this voltage is amplified by vox amplifier V14B and fed to vox rectifier which is one of the diodes of V14. The positive d-c output of the vox rectifier is applied to the grid of vox relay amplifier V4B, causing it to conduct current and actuate the vox relay, K2. Contacts of K2 switch the receiver antenna lead, the other relay coils, and the -70-volt d-c muting and bias voltage. Relays K3 and K4 switch the metering circuits from receive to transmit, the low plate voltages from receive to transmit tubes, and the avc and alc leads.

The anti vox circuit provides a threshold voltage to prevent loudspeaker output (picked up by the microphone circuits) from tripping the KWM-2 into transmit function. Some of the receiver output audio voltage is connected through C235 to the ANTI VOX GAIN control, R45. Signal from the slider of this potentiometer is rectified by the anti vox rectifier, which is the other diode of V14. Negative d-c output voltage from the anti vox rectifier, connected to the grid of V4B, provides the necessary anti vox threshold. ANTI VOX GAIN control R45 adjusts the value of the anti vox voltage threshold so that loudspeaker output will not produce enough positive d-c output from the vox rectifier to exceed the negative d-c output from the anti vox rectifier and cause V4B to actuate K2. However, speech energy into the microphone will cause the positive vox voltage to overcome the negative anti vox voltage and produce the desired action of K2.

SECTION IV
SERVICE INSTRUCTIONS

4.1 GENERAL.

Included in this section are signal tracing procedures, alignment and neutralization procedures, and voltage and resistance measurements.

4.2 TRANSMITTER SIGNAL TRACING.

Table 4-1 lists significant test points and normal signal levels. Figure 4-1 shows location of adjustments. Before making measurements, set EMISSION switch to USB, and disable the power amplifier by disconnecting the jumper between J5 and J6 and removing the high-voltage rectifier tube from its socket. Set meter switch to GRID. Peak EXCITER TUNING and turn VOX GAIN control full counterclockwise. Short PTT jack J16 to ground to key the KWM-2 to transmit. Connect signal generator output to test points indicated in table 4-1, and adjust signal generator output attenuator until PA grid current just begins to show on the meter. Attenuator reading is signal voltage necessary at that point. Voltages given in the table are nominal and may vary plus or minus 20 percent. Be careful, each time, to set signal generator to frequency shown in the table. Oscillator output voltage may be measured with a vacuum-tube voltmeter.

TABLE 4-1. TRANSMITTER SIGNAL LEVELS

TEST POINT	BAND-SWITCH POSITION	SIGNAL GENERATOR FREQUENCY	SIGNAL VOLTAGE AT TEST POINT
V8-2 (grid)	3.8	3.9 mc	1.1 volts
	7.2	7.3 mc	0.7 volt
	14.2	14.3 mc	1.95 volts
	21.4	21.5 mc	1.4 volts
	10A	28.6 mc	1.8 volts

TABLE 4-1. TRANSMITTER SIGNAL LEVELS (Cont)

TEST POINT	BAND-SWITCH POSITION	SIGNAL GENERATOR FREQUENCY	SIGNAL VOLTAGE AT TEST POINT
V7-1 (grid)	3.8	3.9 mc	42,000 microvolts
	7.2	7.3 mc	50,000 microvolts
	14.2	14.3 mc	110,000 microvolts
	21.4	21.5 mc	80,000 microvolts
	28A	28.6 mc	115,000 microvolts
	28B, 28C	According to crystal used	
V6-2 (grid)	14.2	3.055 mc	80,000 microvolts
V5-2 (grid)	14.2	3.055 mc	160,000 microvolts
V4A-6 (grid)	14.2	455 kc	36,000 microvolts
For following, disconnect signal generator, remove J16 short, set EMISSION switch to TUNE, and adjust MIC GAIN for grid current threshold. Measure with vtvm.			
V3A-7 (cathode)	Any	1350 cps*	36 millivolts
V3A-9 (grid)	Any	1350 cps*	85 millivolts
V11B-9 (grid)	Any	1350 cps*	40 millivolts
For following, turn EMISSION switch to USB, and connect audio oscillator to J11. Set MIC GAIN fully clockwise, and adjust audio oscillator output for PA grid current threshold. Measure input at J11 with a-c vtvm.			
V1A-9 (grid) or J11 PHONE PATCH	Any	1350 cps	11 millivolts
For following, measure at test point with vtvm.			
V6-3	3.6		1.5 volts
	7.0		1.5 volts
	14.0		1.5 volts
	21.2		1.5 volts
	38.5		1.5 volts
V5-2 or 7	Vfo set at 100		1.5 volts
Wiper of R15	Any		1.5 volts

*Frequency of internal tone oscillator.

4.3 RECEIVER SIGNAL TRACING.

Table 4-2 lists significant test points and normal signal levels. Figure 4-1 shows location of test points and adjustments. All r-f and i-f measurements were made by connecting a vacuum-tube voltmeter to the avc bus and increasing signal generator output until the avc threshold is reached. The avc threshold voltage is the point at which the d-c vtvm indication just changes with increased signal level. The receiver was tuned to 14.1 mc for these measurements and test signal injected at indicated test points. Signal voltage values are taken from signal generator output attenuator. All values are nominal and may vary ±20% without degrading performance.

4.4 VOLTAGE AND RESISTANCE MEASUREMENTS.

Table 4-3 lists voltage and resistance of all tube sockets of the KWM-2 except that of the vfo tube, V301. DO NOT OPEN the oscillator can. Measurements were made under the following conditions:

a. All measurements with vtvm and with all tubes in sockets. Unless otherwise noted in table, all measurements made with R.F. GAIN at maximum, A.F. GAIN at minimum, EMISSION switch in USB position, BAND switch in 14.2 position, vfo dial at 100, OFF-ON-NB-CAL switch in ON position. All voltages on transmitter tubes are taken with PTT jack J16 shorted to ground and MIC GAIN control full counterclockwise, but not far enough to close S14.

TABLE 4-2. RECEIVER SIGNAL LEVELS

TEST POINT	FREQUENCY	VOLTAGE
V15-B	455 kc	400,000 microvolts
V15B-9	455 kc	1.3 volts*
V3B-6	455 kc	8000 microvolts
V1B-6	455 kc	180 microvolts
V17B-9	2.5-2.7 mc	1.85 volts*
V17B-8	3.055 mc	90 microvolts

*Measured with vacuum-tube voltmeter.

TEST POINT	FREQUENCY	VOLTAGE
V13B-8	High-frequency oscillator injection signal (17.155 mc)	1.8 to 3.0 volts*
V13B-9	14.1 mc	110 microvolts
V7-1	14.1 mc	11 microvolts
J2 (RCVR ANT) or J1 (OUTPUT)	14.1 mc	2.2 microvolts

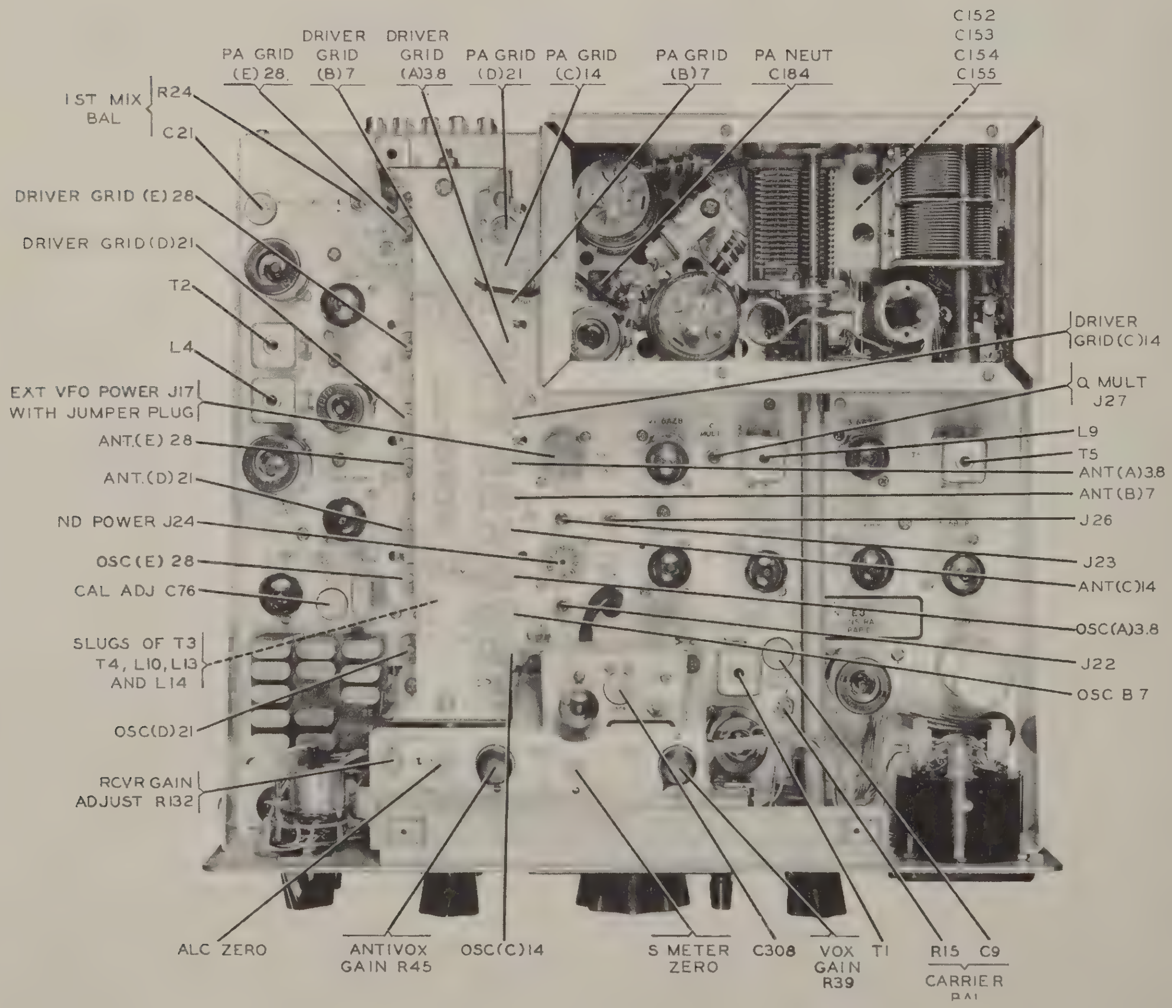


Figure 4-1. Locations of Test Points and Adjustments

b. Resistances of less than one ohm listed as zero.

c. Voltage measurements made with the tube under test operating normally, J16 shorted to ground, no audio input to transmitter, no transmitter power output.

d. Resistance measurements made with power supply plug removed from J13.

e. All measurements made from tube socket pin to ground.

f. When two voltages are given for same tube pin, the first is for receive condition and the second for transmit condition.

WARNING

Do not attempt any measurements of power amplifier plate voltage without special high-voltage test probe. Voltage here is 800 volts d-c. Do not make any other voltage or resistance measurements on KWM-2 with high voltage applied. Remove high-voltage rectifier from socket in power supply.

TABLE 4-3. VOLTAGE AND RESISTANCE MEASUREMENTS

TUBE		PIN NUMBER									PLATE CAP
		1	2	3	4	5	6	7	8	9	
V1	D-C V	290/35	193/32	2.6/0	0	0	-1.47/-18.5	0.6	28/40	0.1	
	A-C V				6.3	0					
	Ohms	14K	40K	35K	0	0	4.4 meg	200	75K	1 meg	
V2	D-C V	279/259	0	298/275	0	0	285/263	21	128/115	127/112	
	A-C V				6.3	0					
	Ohms	14K	1.9 meg	110K	0	0	60K	∞	7K	60K	
V3	D-C V	280/27	160/26	0	0	0	-1.25/-18.5	0/10	-0.5/273	0	
	A-C V				6.3	0					
	Ohms	14K	39K	0	0	0	4.4 meg	900	10K	9	
V4	D-C V	-0.5/270	-0.2/95	0/2.1	0	0	-0.8	20/0	283/80	0/-0.6	
	A-C V				6.3	0					
	Ohms	10K	25K	750	0	0	3.5 meg	2K	27K	10 meg	
V5	D-C V	275/250	-62/0	0/1.8	0	0	280/255	-62/0	0/1.9	0	
	A-C V				0	0				6.3	
	Ohms	14K	540K	270	0	0	14K	540K	250	0	
V6	D-C V	-0.2/235	-0.7/0	0/1.7	0	0	-0.2/235	-0.7/0	0/1.8	0	
	A-C V				6.3	6.3				0	
	Ohms	12.5K	90K	240	0	0	12.5K	100K	230	0	
V7	D-C V	-1.4/-1.0	0	0	0	270/250	125/110	0			
	A-C V			0	6.3						
	Ohms	8 meg	0	0	0	13.2K	28K	0			
V8	D-C V	0/3	-62/0	-1.0/140	0	0	290/265	0	-1.0/140	-62/0	
	A-C V				0	6.3					
	Ohms	110	40K	34K	0	0	13K	0	34K	40K	
V9	D-C V	0	0	-0.16/245	0	-60	0	0	0		
	A-C V		0					6.3			
	Ohms	2	1.7	10K	2.2	47K	2.2	1.1	0		∞
V10	D-C V	0	0	-0.16/245	0	-60	0	0	0		
	A-C V							6.3			
	Ohms	2	1.7	10K	2.2	47K	2.2	1.1	0		∞

TABLE 4-3. VOLTAGE AND RESISTANCE MEASUREMENTS (Cont)

TUBE		PIN NUMBER									PLATE CAP
		1	2	3	4	5	6	7	8	9	
V11	D-C V	80/98	-2.9	170/200	0	0	275/250	0	1.6/2.0	0	
	A-C V				6.3	0					
	Ohms	70K	70K	240K	0	0	20K	0	650	500K	
V12	D-C V	285/34	2.5/0.2	290/38	0	0	290/37	25/6.8	112/8.9	115/7	
	A-C V				6.3	0					
	Ohms	13.5K	1 meg	62K	0	0	240K	∞	7.4K	56K	
V13	D-C V	162/255	-14	189/175	0	0	290/270	0	1.7/0	0/-62	
	A-C V				6.3	0					
	Ohms	24K	1 meg	60K	0	0	12.8K	0	150	190K	
V14	D-C V	-1.0	0	1.1	0	0	0	92/85	0	0.7	
	A-C V				6.3	0					
	Ohms	19 meg	240K	19 meg	0	0	280K	100K	9.4K	340 Ω	
V15	D-C V	-1.5/-18	2.4/3.2	2.4/3.2	0	0	-1.5/-18	83/239	0/-62	-2.9/0	
	A-C V				6.3	0					
	Ohms	3.4 meg	5K	5K	0	0	3.3 meg	45K	1 meg	800	
V16	D-C V	2.4/3.3	1.6/2.5	90/100	0	0	2.0/0.15	0/-11	110/225	187/235	
	A-C V				6.3	0					
	Ohms	5K	2.4 meg	230K	0	0	70	790K	28K	15K	
V17	D-C V	0	1.0	0	0	0	-1.0	290/36	0/-64	-3.7/0	
	A-C V				0	6.3					
	Ohms	∞	1K	∞	0	0	4.2 meg	12.6K	100K	1.5K	

4.5 ALIGNMENT PROCEDURES.

4.5.1 TRANSMITTER CIRCUITS ALIGNMENT.

4.5.1.1 TEST EQUIPMENT REQUIRED. A signal generator, a vacuum-tube voltmeter, a general coverage communications receiver, and a 100-watt 50-ohm dummy load are required for complete alignment and neutralization. If only touch-up alignment is necessary, and if the transmitter develops 50 to 60 volts r-f at PA grids, alignment with PA grid current indication is satisfactory.

4.5.1.2 455-KC I-F ALIGNMENT. (Refer to figure 4-1 for location of adjustments.)

a. Disconnect the high voltage (800 volts) from the transmitter by removing the high-voltage rectifier tube from the power supply.

b. Disable the screen circuit of the PA tubes by unsoldering one end of the jumper between the P.A. DISABLE jacks, J5 and J6.

c. Connect the r-f probe of a vtvm across the mechanical filter input (junction of C15 and C14 at one of FL1 terminals). Refer to figure 6-2 for location of C15 and C14.

d. Set EMISSION switch to TUNE position. Set MIC GAIN full counterclockwise.

e. Any voltage appearing on the vtvm is due to carrier. Adjust carrier balance potentiometer R15 for minimum vtvm indication. This is a coarse adjustment.

f. Advance MIC GAIN control until vtvm indicates approximately one volt.

g. Peak primary and secondary of T1 for peak vtvm indication. Disconnect vtvm.

4.5.1.3 BAND-PASS I-F ALIGNMENT.

a. Connect signal generator output between pin 2 of the first mixer, V5, and ground. Connect r-f probe of vtvm between junction of C25 and R26 and ground. This point is in the grid circuit of the second transmit mixer, V6.

b. Tune the signal generator output to 3.055 mc. Make a swamping tool by connecting a 1000-ohm resistor and a 0.01-uf capacitor in series and connecting clips to their free pigtails. Connect this swamping tool across terminal 3 (secondary winding) of T2 and ground. This terminal is connected to the T2 end of coupling capacitor C25.

c. Leave PA disabled as in paragraph 4.5.1.2. Turn on KWM-2. Set EMISSION switch to TUNE.

d. Keep vtvm indication at about 0.5 volt by adjusting signal generator output, and peak the primary of T2 and peak L4 with tuning tool, such as Walsco 2543. The primary slug for T2 is in the bottom of the can.

e. Remove the swamping tool from the secondary of T2, and connect it across the primary of T2 (between pins 1 and 6 of the first mixer, V5). Peak the secondary of T2 (top of shield can). Remove swamping tool.

4.5.1.4 R-F CIRCUITS ALIGNMENT.

a. Set the EXCITER TUNING control to 3.5 on the logging scale (lower edge of 40-meter band). Align the tops of the iron cores with the tops of the coil forms by screwdriver adjustments on slug rack.

b. Set tuning dial to 0.

c. Set the BAND switch to 28A and the EXCITER TUNING control to 9 on the logging scale (midway in 28-mc band).

d. Connect r-f vtvm from pin 5 of V9 to ground.

e. Set EMISSION switch to TUNE.

f. Advance MIC GAIN until vtvm indicates PA grid voltage.

g. Peak the trimmers marked (E) 28 for maximum PA grid voltage indication on the vtvm. Keep the indication below 30 volts by adjusting the MIC GAIN as necessary.

h. Remove the r-f probe connection from pin 5 of V9. Set meter switch to GRID position. Repeak the driver plate circuit trimmer, using the PA grid current as peak indication. It may be necessary to advance the MIC GAIN control setting to obtain a grid current indication.

i. Replace the r-f probe connection at V9-5. Set EXCITER TUNING control to 7.5 on the logging scale (lower edge of 21.0-mc band). Set BAND switch to 21.0 position.

j. Peak the trimmers marked (D)21 for maximum PA grid indication on the vtvm. Keep the indication below 30 volts as in step g.

k. Remove the r-f probe connection, and repeak the driver plate circuit trimmer, using PA grid current as peak indication.

l. Replace the r-f probe connection at V9-5. Set EXCITER TUNING control to 6 on the logging scale (lower edge of 14-mc band). Set BAND switch to 14.0.

m. Peak the trimmers marked (C)14 for maximum PA grid voltage indication. Keep the indication below 30 volts as in step g.

n. Remove the r-f probe connection, and repeak the driver plate circuit trimmer, using PA grid current as peak indication.

o. Replace the r-f probe connection at V9-5. Set EXCITER TUNING control to 4.5 on the logging scale (upper end of 7-mc band). Set BAND switch to 7.2. Turn tuning dial to 200.

p. Peak the trimmers marked (B)7.0 for maximum PA grid voltage indication, keeping grid voltage below 30 volts.

q. Remove the r-f probe connection and repeak the driver plate circuit trimmer, using PA grid current as peak indication.

r. Replace the r-f probe connection at V9-5. Set EXCITER TUNING control to 2.8 on the logging scale (upper end of 3.8-mc band). Set BAND switch to 3.8.

s. Peak the trimmers marked (A)3.8 for maximum PA grid voltage indication, keeping the grid voltage below 30 volts.

t. Remove probe and repeak the driver plate circuit trimmer, using PA grid current as peak indication.

4.5.1.5 CRYSTAL OSCILLATOR ALIGNMENT.

a. This procedure is a refinement which peaks the oscillator plate circuits in the center of the 200-kc tuning range. Turn the tuning dial to 100.

b. Set BAND switch to 28A. Adjust EXCITER TUNING control for a peak on the PA grid current meter. Set EMISSION switch to TUNE. Increase MIC GAIN setting, if necessary, to obtain grid current indication.

c. Repeak the (E)28 trimmer in the crystal oscillator plate circuit.

d. Set the BAND switch to 21.2, and adjust EXCITER TUNING control for peak in grid current.

e. Repeak the (D)21 trimmer in the oscillator plate circuit.

f. Repeat this procedure with BAND-switch settings of 14.0, 7.0, and 3.6, adjusting the crystal oscillator plate circuit trimmers (C)14, (B)7.0, and (A)3.8 respectively.

4.5.1.6 PA NEUTRALIZING.

a. Disable PA plate and screen circuits as in paragraph 4.5.1.2, steps a and b.

b. Connect a 50-ohm, noninductive, 100-watt dummy load to OUTPUT jack J1.

c. Remove the cover on the power amplifier shielded compartment, and connect the r-f probe of the vtvm at the top of PA plate choke L17.

d. Set BAND switch to 14.0, EMISSION switch to LOCK, and meter switch to GRID.

e. Advance MIC GAIN setting as necessary, and adjust EXCITER TUNING for peak PA grid current.

f. Adjust P.A. TUNING control for maximum r-f voltage indication on vtvm. Adjust MIC GAIN as necessary to keep this indication below 0.5 volt.

g. From bottom chassis, adjust the PA neutralizing capacitor, C184, for a dip in the vtvm indication. This voltage is PA plate feedthrough.

h. Remove the r-f probe connection from the top of L17, and replace the PA compartment cover.

4.5.1.7 DRIVER NEUTRALIZING.

a. Connect the high-voltage plate supply to the PA tubes by replacing the rectifier tube. Connect the jumper between J5 and J6 (PA DISABLE) jacks to energize PA screen grids.

b. Remove the screen voltage to the driver tube, V8, by unsoldering the screen B+ lead connected to C182 feedthrough capacitor.

c. Connect the r-f probe of the vtvm across the dummy load at J1.

d. Set the BAND switch to 14.0, EMISSION switch to LOCK, and meter switch to PLATE.

e. Adjust the bias control in the power supply for 40-ma no-signal PA plate current. It will be necessary to have the EMISSION switch in LSB or USB position and MIC GAIN full counterclockwise for this adjustment. Reset EMISSION switch to LOCK position.

f. Increase MIC GAIN setting, and adjust EXCITER TUNING and P.A. TUNING controls for maximum voltage across the 50-ohm load. This level will be less than 0.3 volt.

g. Adjust the driver neutralizing capacitor, C117, for a voltage dip. This capacitor is located on the shield partition closest to the shield can. Refer to figure 6-3.

4.5.1.8 FEEDBACK NEUTRALIZING.

a. Set BAND switch to 28A position, EMISSION switch to TUNE, and meter switch to PLATE position.

b. Adjust EXCITER TUNING control for a peak in PA plate current.

c. Dip the PA plate current with the P.A. TUNING control.

d. Repeat steps b and c above.

e. Adjust the feedback neutralizing capacitor, C120, (on driver-PA shield below chassis and farthest from shield cans) until PA plate current dip and power output peak coincide. Readjust the MIC GAIN as necessary to hold PA plate current below saturation during this adjustment.

f. Set BAND switch to 21.2, peak EXCITER TUNING control, and dip PA plate current with P.A. TUNING control.

g. Check that PA plate current dip and power output peak occur at same setting of P.A. TUNING control.

h. Repeat this check on bands 14.2, 7.0, and 3.6. Reconnect power to driver screen grid.

4.5.1.9 VFO SIDEBAND FREQUENCY-SHIFT ADJUSTMENT.

CAUTION

Do not make this adjustment unless switching from one sideband to the other makes readjustment of tuning dial necessary to keep output signal from shifting. It will always be necessary, after this adjustment, to make carrier balance (null) adjustment given in paragraph 4.5.1.10.

a. Set EMISSION switch to LSB, meter switch to PLATE, BAND switch to 14.0, and tuning dial to 100. Turn VOX GAIN (under top cover) full counterclockwise. Short PTT jack J16 to ground.

b. Rotate CARRIER BAL potentiometer R15 to one end to allow carrier feedthrough from the balanced modulator.

c. Adjust EXCITER TUNING control for maximum plate current, and dip the plate current with the P.A. TUNING control.

d. Tune an auxiliary station receiver to zero beat with the transmitter.

e. Set EMISSION switch to USB, and adjust trimmer C308 (top of vfo can) for zero beat. Remove short from J16 to ground.

4.5.1.10 CARRIER BALANCE ADJUSTMENT.

a. Set BAND switch to 14.0. Connect dummy load to transmitter output J1. Tune and load transmitter.

b. Set EMISSION switch to LSB position, turn MIC GAIN control full counterclockwise.

c. Connect an r-f vtvm across dummy load and set to lowest scale, or use lowest scale on an r-f wattmeter connected in series with load.

d. Key to transmit by shorting PTT jack J16 to ground. If vtvm indication is 0.2 volt or more, adjust CARRIER BAL potentiometer R15 and trimmer C9 until the vtvm indication is less than 0.2 volt. These adjustments interact, so adjust first one and then the other until neither produces any further decrease in vtvm indication.

4.5.1.11 FIRST MIXER BALANCE ADJUSTMENT.

a. Tune and load the transmitter into dummy load at 14.1 mc. Loosely couple a general coverage communications receiver to the transmitter output. Tune the communications receiver back and forth across 14.555 mc until the signal is heard.

b. Adjust the mixer balance potentiometer, R24, and the trimmer, C21, for minimum output. These adjustments interact, so adjust first one and then the other until neither produces further decrease in output.

4.5.1.12 ALC ZERO ADJUSTMENT.

a. Turn MIC GAIN full counterclockwise until switch clicks.

b. Set meter switch to ALC position.

c. Short PTT jack to ground.

d. Adjust ALC ZERO potentiometer R36 (top of chassis near R45) until meter indicates zero.

4.5.2 RECEIVER CIRCUITS ALIGNMENT.

If the transmitter circuits are aligned first, the r-f amplifier tuned circuits, the high-frequency crystal oscillator tuned circuits, the vfo sideband frequency-shift adjustment, and the band-pass i-f transformer alignment will already be completed for the receiver alignment. The only alignments remaining for the receiver circuits are the i-f alignment, the r-f gain adjustment, the S-meter zero adjustment, and crystal calibrator trimmer adjustment.

4.5.2.1 455-KILOCYCLE I-F ALIGNMENT.

a. Remove vfo tube V301 from socket.

b. Set EMISSION switch to USB.

c. Connect signal generator to pin 8 of V17B, and increase signal generator output until S-meter shows slight indication (S3). Rock the signal generator frequency to center the signal at the approximate center of the filter pass band.

NOTE

> If a vtvm is available, it may be connected to the avc bus and used as alignment peak indicator.

d. Adjust the slugs of L9 and T5 for peak indication on the S-meter. Reduce signal generator output as necessary to keep S-meter indication low. Repeak L9 and T5 as in any standard alignment procedure.

e. Replace vfo tube.

4.5.2.2 R-F GAIN AND S-METER ZERO ADJUSTMENTS.

a. Set receiver to middle of favorite operating band, and peak EXCITER TUNING control for maximum output. Set R.F. GAIN control (front panel) to maximum clockwise position. Tune calibrated signal generator to same frequency as receiver, and set A.F. GAIN control to maximum counterclockwise position.

b. Short RCVR ANT. jack J2 to ground, and adjust S-METER ZERO potentiometer R121 so S-meter reads zero.

c. Remove short from J2, and apply 100 microvolts from calibrated signal generator. Adjust RF GAIN ADJUST (R132) until S-meter reads S-9.

d. Repeat steps b and c until S-meter reads zero with J2 shorted to ground and S-9 with 100 microvolts input at J2.

4.5.2.3 CRYSTAL CALIBRATOR ADJUSTMENT.

a. Tune WWV to zero beat at 15.0 mc at a time when Station WWV is not transmitting a tone.

b. Turn the function switch to CAL position. Adjust CAL ADJUST trimmer C76 for zero beat of calibration signal.

SECTION V
SPECIFICATIONS

5.1 KWM-2 TRANSCEIVER.

The KWM-2 Transceiver receives and transmits single-sideband or CW signals in all amateur bands between 3.4 and 30.0 mc.

5.2 FREQUENCY COVERAGE.

The transceiver coverage is in 14 bands, each 200 kilocycles wide. With crystals furnished, they cover the entire amateur bands of 80 meters, 40 meters, 20 meters, 15 meters, a 14.8- to 15.0-mc band including WWV, and the 28.5- to 28.7-mc portion of the 10-meter band. The two remaining crystal sockets may be used for crystals selected to provide two additional 200-kc bands within the 10-meter band. Other crystals may be substituted for those furnished to place the transceiver at other frequencies through the range.

5.3 REQUIREMENTS FOR OPERATION.

The transceiver requires a 110-volt, 50- to 60-cycle-per-second, a-c power source and a power supply, such as the 516F-2, for fixed-station operation. It consumes approximately 235 watts of power from the line in receive function and approximately 475 watts in transmit function. The transceiver may be operated mobile by using a power supply, such as the 516E-1 for 12-volt d-c operation or a 516E-2 for 24- to 28-volt operation. In mobile operation the transceiver requires 800 volts d-c at 250 ma; 275 volts d-c at approximately 175 ma; a bias supply adjustable between -60 and -80 volts; and 6, 12, or 24 volts d-c filament supply at 11.0, 5.5, or 2.75 amperes respectively. Any high-impedance crystal or dynamic microphone may be used. A 4-ohm speaker is required. The antenna and feed system must present a 50-ohm load with swr not exceeding 2.0 to 1.

5.4 SPECIFICATIONS.

Frequency range	3.4 to 30.0 megacycles. With crystals furnished, bands are as follows: 80 meters - 3.4 to 3.6 mc, 3.6 to 3.9 mc, and 3.8 to 4.0 mc. 40 meters - 7.0 to 7.2 mc, and 7.2 to 7.4 mc. 20 meters - 14.0 to 14.2 mc, and 14.8 to 15.0 mc (WWV).

	15 meters - 21.0 to 21.2 mc, 21.2 to 21.4 mc, and 21.4 to 21.6 mc.
	10 meters - 28.5 to 28.7 mc.
Mode	Single sideband (either sideband selectable) or CW.
Type of service	SSB-continuous; CW-50% duty cycle.
Power consumption from a-c line	235 watts in receive function 475 watts in transmit function.
Plate power input	175 watts PEP on SSB, 160 watts on CW.
Power output	100 watts PEP (nominal) into 50 ohms.
Microphone input impedance	High impedance.
R-f output impedance	50 ohms with not more than 2.0-to-1 swr.
R-f input impedance	50 ohms.
Matching speaker impedance	4 ohms.
Matching phone-patch impedance	500 to 600 ohms, receive output to phone patch; high impedance phone-patch input to transmitter.
Frequency stability	Total variation after warmup not more than 100 cps.
Calibration accuracy	1 kilocycle.
Keying	Break-in.
Audio-frequency response	300-2400 cps ±6 db.
Carrier suppression	Carrier 40 db down from output signal.
Unwanted sideband	50 db down from output signal.
Oscillator feedthrough or mixer products (undesired)	50 db down from output signal.
Second harmonic radiation	50 db down from output signal.
Third order distortion	30 db down from output signal.
Receiver sensitivity	0.5 microvolt for 10-db signal to noise ratio for SSB operation in amateur bands.
Receiver selectivity	2.1 kc bandwidth at 6 db down, 4.2 kc bandwidth at 60 db down.
Receiver spurious responses	Image rejection better than 50 db. Internal spurious signals below one microvolt equivalent antenna input.
Receiver output level	1.0 watt maximum.
Size	7-3/4 inches high, 15-1/8 inches wide, 13-3/4 inches deep, overall
Weight	18 pounds, 3 ounces.

5.5 TUBE AND SEMICONDUCTOR COMPLEMENT.

TABLE 5-1. TUBES AND SEMICONDUCTORS

SYMBOL	FUNCTION	TYPE
V1A	First microphone amplifier	1/2 6AZ8
V1B	First receiver i-f amplifier	1/2 6AZ8
V2A	Vfo cathode follower	1/2 6U8A
V2B	Tone oscillator	1/2 6U8A
V3A	Microphone amplifier cathode follower	1/2 6AZ8
V3B	Receiver second i-f amplifier	1/2 6AZ8
V4A	Transmitter i-f amplifier	1/2 6AZ8
V4B	Vox relay amplifier	1/2 6AZ8
V5	First transmitter mixer	12AT7
V6	Second transmitter mixer	12AT7
V7	Receiver-transmitter r-f amplifier	6DC6
V8	Transmitter driver	6CL6
V9	Transmitter power amplifier	6146
V10	Transmitter power amplifier	6146
V11A	Beat-frequency oscillator	1/2 6U8A
V11B	Second microphone amplifier	1/2 6U8A
V12A	Crystal calibrator	1/2 6U8A
V12B	Crystal oscillator cathode follower	1/2 6U8A
V13A	High-frequency crystal oscillator	1/2 6U8A
V13B	Receiver first mixer	1/2 6U8A
V14A	Vox rectifier (one diode), anti vox rectifier (other diode)	2/3 6BN8
V14B	Vox amplifier	1/3 6BN8
V15A	Avc rectifier (both diodes)	2/3 6BJ8
V15B	Product detector	1/3 6BJ8
V16A	Receiver first a-f amplifier	1/2 6EB8
V16B	Receiver a-f output amplifier	1/2 6EB8
V17A	Alc rectifier (both diodes)	2/3 6BN8
V17B	Receiver second mixer	1/3 6BN8
V301	Variable-frequency oscillator	6AU6

5.6 AVAILABLE ACCESSORIES.

TABLE 5-2. AVAILABLE ACCESSORIES

ITEM	FUNCTION	COLLINS PART NUMBER
136B-2 Noise Blanker	Eliminates noise pulses when the noise components present on the antenna have energy distribution in the 40-mc portion of the spectrum and when the noise pulses have a repetition rate not in excess of 100,000 pulses per second.	522 1661 00
312B-3 Speaker Box	Station speaker.	522 1166 00
312B-4 Station Control	Speaker, phone patch, directional wattmeter, and station control switches.	522 1167 00
399C-1 External VFO	Speaker, extra 70K-2 vfo, and vfo control switches for operating transmitter and/or receiver in different portions of 200-kc band.	522 1597 00

TABLE 5-2. AVAILABLE ACCESSORIES (Cont)

ITEM	FUNCTION	COLLINS PART NUMBER
312B-5 Station Control	Combinations of features and functions of 312B-4 and 399C-1 accessories.	522 1668 00
351E-4 Mounting Plate	Mount on table or bench.	522 1482 003
351D-2 Mobile Mount	Mount for mobile operation.	522 1726 00
516F-1 A-C Power Supply*	A-c power supply.	522 0847 00
516F-2 A-C Power Supply	A-c power supply.	522 1170 00
516E-1 D-C Power Supply	Mobile power supply for 12-14-volt source.	522 0846 005
516E-2 D-C Power Supply	Mobile power supply for 24-28-volt source.	522 0846 00
PJ-068	Microphone plug.	361 0001 00
302C-3 Directional Wattmeter	Measure forward and reflected power.	522 1696 00
*Use with special cable adapter, Collins part number 543 8791 00.		

SECTION VI
PARTS LIST

KWM-2 Transceiver

ITEM	DESCRIPTION	COLLINS PART NO.
	KWM-2 TRANSCEIVER	522 1611 00
C1, C17, C48, C56, C216, C224, C260	CAPACITOR, FIXED, CERAMIC: 0.02 uf, +100% -20%, 500 v dc	913 2142 00
C2	CAPACITOR, FIXED, MICA: 220 uuf, ±10%, 500 v dc	912 2841 00
C3, C4, C24, C96, C100, C103, C104, C127, C256	CAPACITOR, FIXED, CERAMIC: 4700 uuf, +100% -20%, 500 v dc	913 3012 00
C5, C82, C123, C137, C228, C230, C241	CAPACITOR, FIXED, CERAMIC: 1000 uuf, +80% -20%, 500 v dc	913 1292 00
C6, C160	CAPACITOR, FIXED, CERAMIC: 0.47 uf, +80% -20%, 25 v dc	913 3804 00
C7, C8, C20, C43, C47, C71, C75, C80, C89, C92, C107, C108, C122, C126, C139, C146, C148, C156, C169, C188, C193, C196, C200, C202, C211, C212, C222, C229, C235, C252	CAPACITOR, FIXED, CERAMIC: 10,000 uuf, +100% -20%, 500 v dc	913 3013 00

ITEM	DESCRIPTION	COLLINS PART NO.
C9, C21, C35, C116, C134, C136	CAPACITOR, VARIABLE, CERAMIC: 5 uuf min., 37.5 uuf max.; 350 v dc	917 1073 00
C10	CAPACITOR, FIXED, MICA: 33 uuf, ±10%, 500 v dc	912 2781 00
C11, C15, C23, C27, C40, C41, C44, C45, C58, C59, C61, C62, C72, C83, C91, C124, C186, C187, C219, C220, C226, C232, C234	CAPACITOR, FIXED, CERAMIC: 1000 uuf, +100% -20%, 500 v dc	913 3009 00
C1, C17, C48, C56, C216, C224, C260	CAPACITOR, FIXED, CERAMIC: 0.02 uf, +100% -20%, 500 v dc	913 2142 00
C2	CAPACITOR, FIXED, MICA: 220 uuf, ±10%, 500 v dc	912 2841 00
C3, C4, C24, C96, C100, C103, C104, C127, C256	CAPACITOR, FIXED, CERAMIC: 4700 uuf, +100% -20%, 500 v dc	913 3012 00
C5, C82, C123, C137, C228, C230, C241	CAPACITOR, FIXED, CERAMIC: 1000 uuf, +80% -20%, 500 v dc	913 1292 00
C6, C160	CAPACITOR, FIXED, CERAMIC: 0.47 uf, +80% -20%, 25 v dc	913 3804 00

ITEM	DESCRIPTION	COLLINS PART NO.
C7, C8, C20, C43, C47, C71, C75, C80, C89, C92, C107, C108, C122, C126, C139, C146, C156, C158, C169, C188, C193, C196, C200, C202, C211, C212, C222, C229, C235, C252	CAPACITOR, FIXED, CERAMIC: 10,000 uuf, +100% -20%, 500 v dc	913 3013 00
C9, C21, C36, C116, C134, C136	CAPACITOR, VARIABLE, CERAMIC: 5 uuf min., 37.5 uuf max.; 350 v dc	917 1073 00
C10	CAPACITOR, FIXED, MICA: 33 uuf, ±10%, 500 v dc	912 2781 00
C11, C15, C23, C27, C40, C41, C44, C45, C58, C59, C61, C62, C72, C83, C91, C124, C186, C187, C219, C220, C226, C232, C234	CAPACITOR, FIXED, CERAMIC: 1000 uuf, +100% -20%, 500 v dc	913 3009 00
C12/13, C18/19, C28/29, C78/237, C85/86, C147, C161/162, C163/164, C165/166, C167/190, C181/182, C191/192, C194/201, C195/197, C198/199, C203/204, C205/206, C207/208, C209/210, C242/243, C244/245, C246/247, C250/251	CAPACITOR, FIXED, CERAMIC: dual type, 0.01 uf, GMV, 500 v dc per section	913 3829 00
C14	CAPACITOR, FIXED, MICA: 100 uuf, ±5%, 500 v dc	912 2816 00
C16	CAPACITOR, FIXED, MICA: 51 uuf, ±5%, 500 v dc	912 2795 00
C22, C35	CAPACITOR, FIXED, MICA: 22 uuf, ±5%, 500 v dc	912 2768 00
C25, C79	CAPACITOR, FIXED, CERAMIC: 3 uuf, ±1/2, 500 v dc	916 0145 00
C26	CAPACITOR, TUBULAR, CERAMIC: 6 uuf, ±1/2 uuf, 500 v dc	916 0122 00
C30, C31, C94	CAPACITOR, FIXED, MICA: 10 uuf, ±10%, 500 v dc	912 2754 00
C32, C34, C37, C63, C65, C67, C68, C70, C76, C109, C113, C115, C120, C129, C130, C132, C184	CAPACITOR, VARIABLE, CERAMIC: 8 to 75 uuf, 350 v dc	917 1075 00
C33, C64, C133	CAPACITOR, FIXED, MICA: 130 uuf, ±5%, 500 v dc	912 2825 00
C38	CAPACITOR, FIXED, MICA: 360 uuf, ±5%, 500 v dc	912 2855 00
C39, C117	CAPACITOR, VARIABLE, CERAMIC: 1.5 to 10.5 uuf, 350 v dc	917 1071 00
C42	NOT USED	
C46, C49, C90, C221, C227, C236, C238	CAPACITOR, FIXED, CERAMIC: 0.1 uf, +80% -20%, 500 v dc	913 3152 00
C50, C51, C52, C105	CAPACITOR, FIXED, MICA: 470 uuf, ±5%, 500 v dc	912 2864 00
C53	CAPACITOR, FIXED, MICA: 22 uuf, ±10%, 500 v dc	912 2769 00
C54	NOT USED	
C55, C66, C74	CAPACITOR, FIXED, MICA: 47 uuf, ±5%, 500 v dc	912 2792 00
C60	CAPACITOR, FIXED, MICA: 20 uuf, ±10%, 500 v dc	912 2766 00
C69	CAPACITOR, FIXED, MICA: 160 uuf, ±2%, 500 v dc	912 2830 00
C73, C81	NOT USED	
C77, C87, C240	CAPACITOR, FIXED, MICA: 100 uuf, ±10%, 500 v dc	912 2817 00
C84, C101, C157, C159, C170, C225, C231, C233, C253	CAPACITOR, FIXED, CERAMIC: 0.1 uf, -30% +80%, 75 v dc	913 3794 00
C88	CAPACITOR, FIXED, MICA: 510 uuf, ±5%, 300 v dc	912 2867 00
C93	CAPACITOR, FIXED, CERAMIC: 0.05 uf, GMV, 100 v dc	913 3679 00
C95	NOT USED	
C97	CAPACITOR, FIXED, MICA: 27 uuf, ±10%, 500 v dc	912 2775 00
C98, C99, C214, C215, C223	CAPACITOR, FIXED, CERAMIC: 470 uuf, +100% -20%, 500 v dc	913 3007 00
C102	CAPACITOR, FIXED, ELECTROLYTIC: 100 uf, -10% +75%, 6 v dc	183 1782 00
C106	CAPACITOR, FIXED, ELECTROLYTIC: 30 uf, 20 uf, 15 uf; each -10% +40%, 350 v dc	183 1702 00
C110	CAPACITOR, FIXED, MICA: 360 uuf, ±5%, 500 v dc	912 2855 00
C111	CAPACITOR, VARIABLE, CERAMIC: 3 uuf min., 18 uuf max, 350 v dc	917 1072 00
C112	CAPACITOR, FIXED, MICA: 240 uuf, ±2%, 500 v dc	912 2842 00
C114, C128, C135	CAPACITOR, FIXED, MICA: 51 uuf, ±10%, 500 v dc	912 2796 00
C118, C138	CAPACITOR, FIXED, CERAMIC: 1.0 uuf, ±1/4 uuf, 500 v dc	916 0070 00
C119	CAPACITOR, FIXED, CERAMIC: 2 uuf, ±1/2, 500 v dc	916 0076 00
C121, C131, C217, C218	CAPACITOR, FIXED, MICA: 220 uuf, ±5%, 500 v dc	912 2840 00
C125	CAPACITOR, FIXED, MICA: 330 uuf, ±2%, 500 v dc	912 2851 00
C140 thru C145, C248, C249	CAPACITOR, FIXED, CERAMIC: 500 uuf, ±10%, 500 v dc	913 0998 00
C148, C149, C168	CAPACITOR, FIXED, CERAMIC: 0.001 uf, +100% -20%, 2000 v dc	913 3537 00
C150	CAPACITOR, VARIABLE, AIR: plate meshing type, 12.0 uuf min. to 250.0 uuf max, 1000 v rms	920 0136 00
C151	CAPACITOR, VARIABLE, AIR: dual section, 13.5 uuf min. to 452.3 uuf max ea section, 360 v ac, 60 cps min. breakdown	920 0138 00
C152, C153, C154	CAPACITOR, VARIABLE, MICA: 100 uuf to 500 uuf, 1000 v dc	918 0006 00
C155	CAPACITOR, VARIABLE, MICA: 15 uuf to 120 uuf, 1000 v dc	918 0005 00
C171	CAPACITOR, MICA: 510 uuf (p/o T1)	
C172	CAPACITOR, MICA: 240 uuf (p/o T2)	
C173	CAPACITOR, MICA: 240 uuf (p/o T2)	
C174	CAPACITOR, MICA: 130 uuf (p/o T2)	
C175	CAPACITOR, MICA: 180 uuf (p/o L4)	
C176	CAPACITOR, MICA: 510 uuf (p/o L4)	
C177	CAPACITOR, MICA: 180 uuf (p/o L9)	
C178	CAPACITOR, MICA: 510 uuf (p/o T5)	
C179	CAPACITOR, MICA: 510 uuf (p/o T5)	
C180, C183	CAPACITOR, FIXED, CERAMIC: 10 uuf, ±10%, 500 v dc	913 0972 00
C185, C189, C213, C239	NOT USED	
C254	CAPACITOR, FIXED, ELECTROLYTIC: 4 uf, -10% +100%, 350 v dc	183 1783 00
C255	NOT USED	
C257, C258	CAPACITOR, FIXED, MICA: 12 uuf, ±10%, 500 v dc	912 2757 00
C259	CAPACITOR, FIXED, ELECTROLYTIC: 8 uf, -15% +100%, 6 v dc	183 1167 00
CR1, CR2 CR3, CR4	SEMICONDUCTOR DEVICE, DIODE: germanium; Sylvania part no. 1N34A	353 0103 00
DS1	LAMP, INCANDESCENT: 6.3 v, 0.945 w, 0.15 amps; 1-1/8 in. lg max. overall	262 3240 00
DS2	BULB: p/o meter assembly M1	
E1 thru E5	CORE, ADJUSTABLE TUNING: ceramic; 0.5 to 32 mc; 1-1/4 in. lg core body, threaded stud type; 1/2 in. lg	288 2509 00
E6, E7	SHELL, ELECTRICAL CONNECTOR: below surface mtg; steel, cadmium pl, 2-1/16 in. by 1.172 in. by 0.781 in. overall	372 1761 00
E8	CLIP, CRYSTAL: beryllium copper; 0.009 in. thk; 3/8 in. w by 0.393 in. lg by 15/64 in. h; 0.120 in. dia mtg hole	504 8229 001
E9, E10, E13	SHIELD, ELECTRON TUBE: 9 pin medium; cylindrical with flared end; open top; brass; 0.95 in. by 1.065 in.; incl beryllium copper insert	541 6554 003
E11	SHIELD, ELECTRON TUBE: 7 pin medium; brass; incl copper insert and hold-down spring	541 6551 003
E12	SHIELD, ELECTRON TUBE: 9 pin large, brass; incl copper insert and hold-down spring	541 6555 003

KWM-2 Transceiver

ITEM	DESCRIPTION	COLLINS PART NO.
FL1	FILTER, BAND PASS: mechanical, 455.0 kc center frequency; 2.125 kc at 6 db, 5.3 kc at 60 db, terminal impedance 17,000 ohms, resonating capacity 130 uuf	526 9337 00
J1, J18	JACK, TIP: accommodates 1/8 in. plug; ceramic insulation brass contacts	360 0088 00
J2 thru J12, J16 J19 thru J23, J26 J27	JACK, TIP: small banana contact accommodated, (0.125) insulated, plastic	360 0148 00
J13	CONNECTOR, RECEPTACLE, ELECTRICAL: 11 pin male, phenolic insulation, 5 amps, straight shape	372 1757 00
J14	JACK, TELEPHONE: spring leaf contact, J5-2C; 0.253 in. id, 3/4 in. od; thd 1/4 in. barrel 0.276 in. lg; 3/8-32 NEF-2	360 0169 00
J15	JACK, TELEPHONE: spring leaf; 0.728 in. lg by 49/64 in. dia; 2 conductor plug, 23/32 in. lg by 1/4 in. dia shank	358 1050 00
J17, J24	SOCKET, ELECTRON TUBE: 9 pin miniature, top mtg (incl XV1)	220 1054 00
J25, P17	CONNECTOR, PLUG, ELECTRICAL: 9 male contacts; 5 amps; 3800 v ac (incl P17)	372 1841 00
K1	NOT USED	
K2	RELAY, ARMATURE: 2C arrangement, low level RF; 2C arrangement, 300 ma at 275 v dc; 14,000 ohms resistance; continuous duty cycle	970 1940 00
K3	RELAY, ARMATURE: antenna switching type, 2C contact arrangement, 2 amps, 175 w, 2.30 mc; 1 inductive winding, 115 v dc, 10,000 ohms	970 1914 00
K4	RELAY, ARMATURE: 4C arrangement, 150 ma at 250 v dc; 2C arrangement, low level RF; 10,000 ohms resistance; continuous duty cycle	970 1941 00
L1	NOT USED	
L3, L7, L31, L33	COIL, RADIO FREQUENCY: single wound; 3 pi universal wound; unshielded; 2.0 uh, ± 10% at 350 kc; each pi 225 turns of no. 40 AWG copper wire	240 0084 00
L2	COIL, RADIO FREQUENCY: universal pi wound; 6 pies; 10 uh nom inductance	240 0199 00
L4	COIL, ASSEMBLY INTERMEDIATE FREQUENCY: 3.055 mc center freq; 220 kc band pass at 3 db, attenuation 35 db min. from 2.5 mc to 2.7 mc	278 0293 00
L5, L6, L11, L22, L25	COIL, RADIO FREQUENCY: 3 universal wound pi sections, 75 turns ea; no. 36 AWG copper wire; powdered iron coil form; 220 uh inductance, 1 amp	240 0037 00
L9	TUNING UNIT, RADIO FREQUENCY: freq range 440 kc to 470 kc	278 0277 00
L10	COIL, RADIO FREQUENCY: single layer wound; 13 turns no. 28 AWG wire, 1.045 in. lg, panelyte coil form, 0.260 in. id, 0.3544 in. od, 1-11/16 in. lg	544 3135 002
L12	COIL, RADIO FREQUENCY: universal wound; 4 pi, 139 turns no. 36 AWG ea section; 2.0 mh inductance	240 0134 00
L13	COIL, RADIO FREQUENCY: single layer wound, 22 turns #28 AWG wire, panelyte coil form 0.260 in. id, 0.3544 in. od, 1-11/16 in. lg	543 8123 002
L14	COIL, RADIO FREQUENCY: single layer wound, 12 turns, #28 AWG wire, panelyte coil form, 0.260 in. id, 0.3094 in. od, by 1-11/16 in. lg	543 8028 002
L15	COIL: 2 turns of #18 wire (p/o Z1)	
L16	COIL: 2 turns of #18 wire (p/o Z2)	
L17	COIL: RADIO FREQUENCY: single layer wound, 220 turns of no. 32 AWG wire 0.5194 in. dia by 3 in. lg overall	543 8024 00
L18	COIL, RADIO FREQUENCY: 6-1/2 turns single layer wound, #14 AWG copper wire; 5/8 in. id	544 9701 00
L19	COIL, RADIO FREQUENCY: 32 turns no. 18 AWG wire, each turn tapped; 3 in. lg by 1 in. od	506 7848 002
L20	COIL, RADIO FREQUENCY: single layer wound, 39 uh inductance, 2 ohms dc, 500 ma current	240 0171 00
L21	COIL, RADIO FREQUENCY: multiple section duolateral wound; 4 sections; 2.5 mh, 35 to 50 ohms, 0.125 amps	240 2100 00
L23	COIL, RADIO FREQUENCY: single layer wound, 22 uh, 0.30 ohms, 1800 ma	240 0186 00
L24, L28, L32	NOT USED	
L26, L35	COIL, RADIO FREQUENCY: single layer wound; magnet wire w/enamel or formvar insulation; 10.0 uh, 0.60 ohms, 740 ma current rating	240 0149 00
L27	COIL, RADIO FREQUENCY: single layer wound; tinned no. 21 or 22 AWG; 2.70 uh, 1.20 ohms resistance, 500 ma	240 0069 00
L29	COIL, RADIO FREQUENCY: 20 turns #26 AWG copper wire, single layer wound; powdered iron core; 0.200 in. dia by 1/2 in. lg wire lead terminals	544 9700 00
L30, L34	COIL, RADIO FREQUENCY: 20 turns #18 AWG copper magnet wire, single layer wound; powdered iron core; 0.250 in. dia by 1 in. lg; wire lead terminals	544 9699 00
M1	VOLTMETER: panel type, dc type, measures 0-400 ma or 0-60 db plastic case	458 0491 00
O1 thru O6	KNOB, ASSEMBLY: pointer, push on type, black phenolic, approx. 1-1/8 in. dia. 3/4 in. h, incl spring	543 8039 00
O7	KNOB, ASSEMBLY: fluted, 8 flutes push on type, pin mtg, black phenolic, 2.078 in. dia by 0.859 in. h; incl disc; spring and skirt	543 8041 00
O8	KNOB, ASSEMBLY: fluted, 5 flutes push on type, pin mtg, black phenolic, spring, pointer and disc. incl	543 8044 00
O9	KNOB, ASSEMBLY: fluted, 5 flutes push on type, pin mtg, black phenolic, spring, pointer and disc incl	543 8044 00
P1 thru P12, P16, P19 thru P21	PLUG, TIP: phone type; 1 terminal; 1-1/4 in. lg	361 0062 00
P13	CONNECTOR, RECEPTACLE, ELECTRICAL: 11 female socket contacts	372 1759 00
P14, P18, P22 thru P25	NOT LISTED	
P15	PLUG, TELEPHONE JACK: 3 circuit, 3/16 in. nom. barrel dia. black plastic, straight, 3.218 in. lg by 0.500 in. dia.	361 0001 00
P25	CONNECTOR, RECEPTACLE, ELECTRICAL: 9 female contacts, 5 amps; 3800 v ac	372 1842 00
R1, R91, R138, R139	RESISTOR, FIXED, COMPOSITION: 47,000 ohms, ±10%, 1/4 w	745 0809 00
R2, R13, R63, R74, R78, R93, R171	RESISTOR, FIXED, COMPOSITION: 1 megohm, ±10%, 1/4 w	745 0857 00
R3	RESISTOR, FIXED, COMPOSITION: 180 ohms, ±10%, 1/2 w	745 1321 00
R4, R37	RESISTOR, FIXED, COMPOSITION: 68,000 ohms, ±10%, 1/2 w	745 1429 00
R5, R26, R98, R136, R165	RESISTOR, FIXED, COMPOSITION: 0.47 megohm, %10%, 1/4 w	745 0845 00
R7, R50, R76, R80, R123, R125, R145	RESISTOR, FIXED, COMPOSITION: 47,000 ohms, ±10%, 1/2 w	745 1422 00
R8, S14	RESISTOR, VARIABLE, COMPOSITION: 500,000 ohms ±30%, 1/4 w	376 7404 00
R9, R28, R168	RESISTOR, FIXED, COMPOSITION: 56 ohms, ±10%, 1/4 w	745 0704 00
R10, R12, R57, R58, R64, R77, R102, R117, R135, R149, R159, R169	RESISTOR, FIXED, COMPOSITION: 1000 ohms, ±10%, 1/2 w	745 1352 00
R11, R44	RESISTOR, FIXED, COMPOSITION: 0.27 megohms, ±10%, 1/2 w	745 1454 00
R14, R16	RESISTOR, FIXED, COMPOSITION: 270 ohms, ±10%, 1/4 w	745 0728 00
R15, R24, R36	RESISTOR, VARIABLE, COMPOSITION: 250 ohms, ±20%, 0.2 w	376 4621 00
R17, R27, R31, R59, R60, R62	RESISTOR, FIXED, COMPOSITION: 100,000 ohms, ±10%, 1/4 w	745 0821 00
R18	RESISTOR, FIXED, COMPOSITION: 47,000 ohms, ±10%, 1 w	745 3422 00
R19, R21, R101, R162	RESISTOR, FIXED, COMPOSITION: 47 ohms, ±10%, 1/2 w	745 1296 00
R20, R47	RESISTOR, FIXED, COMPOSITION: 68,000 ohms, ±10%, 2 w	745 5729 00
R22, R174	RESISTOR, FIXED, COMPOSITION: 56 ohms, ±10%, 1/2 w	745 1300 00
R23, R25	RESISTOR, FIXED, COMPOSITION: 120 ohms, ±10%, 1/2 w	745 1314 00
R29, R30, R170	RESISTOR, FIXED, COMPOSITION: 220 ohms, ±10%, 1/2 w	745 1324 00
R32, R104, R106	RESISTOR, FIXED, COMPOSITION: 100 ohms ±10%, 1/2 w	745 1310 00
R33	RESISTOR, FIXED, COMPOSITION: 33,000 ohms, ±10%, 1 w	745 3415 00
R34, R83, R119	RESISTOR, FIXED, COMPOSITION: 3.3 megohms, ±10%, 1/4 w	745 0875 00
R35, R49, R71, R127, R130, R154	RESISTOR, FIXED, COMPOSITION: 0.10 megohms, ±10%, 1/2 w	745 1436 00

ITEM	DESCRIPTION	COLLINS PART NO.
R38	RESISTOR, FIXED, COMPOSITION: 270 ohms, ±10%, 1/2 w	745 1328 00
R39, R45	RESISTOR, FIXED, COMPOSITION: 500, 000 ohms, ±30%, 1/4 w	376 7202 00
R40	RESISTOR, FIXED, COMPOSITION: 100, 000 ohms, ±10%, 1 w	745 3436 00
R41, R6	RESISTOR, FIXED, COMPOSITION: 330 ohms, ±10%, 1/2 w	745 1331 00
R42, R48	RESISTOR, FIXED, COMPOSITION: 8. 2 megohms, ±10%, 1/4 w	745 0890 00
R43	RESISTOR, FIXED, COMPOSITION: 10 megohms, ±10%, 1/4 w	745 0893 00
R46, R115	RESISTOR, FIXED, COMPOSITION: 2200 ohms, ±10%, 1/2 w	745 1366 00
R51, R52	RESISTOR, FIXED, COMPOSITION: 0. 39 megohms, ±10%, 1/4 w	745 0842 00
R53	RESISTOR, FIXED, COMPOSITION: 33, 000 ohms, ±10%, 1/4 w	745 0803 00
R54	RESISTOR, FIXED, COMPOSITION: 68, 000 ohms, ±10%, 1/4 w	745 0815 00
R55, R66, R96, R122	RESISTOR, FIXED, COMPOSITION: 0. 22 megohms, ±10%,1/2 w	745 1450 00
R56, R95, *R161	RESISTOR, FIXED, COMPOSITION: 5600 ohms, ±10%, 1/2 w	745 1384 00
R61, R157	RESISTOR, FIXED, COMPOSITION: 150 ohms, ±10%, 1/2 w	745 1317 00
R65, R128	RESISTOR, FIXED, COMPOSITION: 1. 0 megohm, ±10%, 1/2 w	745 1478 00
R67, R79, R120, R141	RESISTOR, FIXED, COMPOSITION: 39, 000 ohms, ±10%, 1/2 w	745 1419 00
R68	RESISTOR, FIXED, COMPOSITION: 15, 000 ohms, ±10%, 1/2 w	745 1401 00
R69, R73	RESISTOR, FIXED, COMPOSITION: 15, 000 ohms, ±10%, 1 w	745 3401 00
R70, R105	RESISTOR, FIXED, COMPOSITION: 22, 000 ohms, ±10%, 2 w	745 5708 00
R72, R153	RESISTOR, FIXED, COMPOSITION: 6800 ohms, ±10%, 2 w	745 5687 00
R75	RESISTOR, FIXED, COMPOSITION: 10 ohms, ±10%, 1/2 w	745 1268 00
R82	RESISTOR, FIXED, COMPOSITION: 4700 ohms, ±10%, 1/4 w	745 0773 00
R84	RESISTOR, VARIABLE, COMPOSITION: 10, 000 ohms, ±30%, 1/4 w	376 7402 00
R85, R99	RESISTOR, FIXED, COMPOSITION: 12, 000 ohms, ±10%, 1/2 w	745 1398 00
R86	RESISTOR, FIXED, WIREWOUND: 2500 ohms, ±10%, 7 w	710 9000 00
R87	RESISTOR, FIXED, COMPOSITION: 6800 ohms, ±10%, 1/2 w	745 1387 00
R88, R126, R129	RESISTOR, FIXED, COMPOSITION: 820 ohms, ±10%, 1/2 w	745 1349 00
R89, R164	RESISTOR, FIXED, COMPOSITION: 0. 22 megohms, ±10%, 1/4 w	745 0833 00
R90	RESISTOR, FIXED, COMPOSITION: 27, 000 ohms, ±10%, 1/2 w	745 1412 00
R92	RESISTOR, VARIABLE, COMPOSITION: 500, 000 ohms, ±30%, 1/4 w	376 7405 00
R94	RESISTOR, FIXED, COMPOSITION: 2. 2 megohms, ±10%, 1/4 w	745 0869 00
R97	RESISTOR, FIXED, COMPOSITION: 68 ohms, ±10%, 1/2 w	745 1303 00
R100	RESISTOR, FIXED, COMPOSITION: 10 ohms, ±10%, 1 w	745 3268 00
R103	RESISTOR, FIXED, COMPOSITION: 10, 000 ohms, ±10%, 1/4 w	745 0785 00
R107	RESISTOR: 47 ohms, ±10%, 2 w (p/o Z1)	
R108	RESISTOR: 47 ohms, ±10%, 2 w (p/o Z2)	
R109 thru R114	RESISTOR, FIXED, COMPOSITION: 12 ohms, ±10%, 1/2 w	745 1272 00
R116, R133	RESISTOR, FIXED, COMPOSITION: 18, 000 ohms, ±10%, 1/2 w	745 1405 00
R118	RESISTOR, FIXED, COMPOSITION: 0. 68 megohms, ±10%, 1/4 w	745 0851 00
R121	RESISTOR, VARIABLE, COMPOSITION: 100, 000 ohms, ±20%, 0. 2 w	376 4622 00
R131	RESISTOR, FIXED, COMPOSITION: 33, 000 ohms, ±10%, 2 w	745 5715 00
R132	RESISTOR, VARIABLE, COMPOSITION: 1000 ohms, ±29%, 0. 2 w	376 4623 00
R134, R160	RESISTOR, FIXED, COMPOSITION: 0. 12 megohms, ±10%, 1/2 w	745 1440 00
R137, R147	RESISTOR, FIXED, COMPOSITION: 82, 000 ohms, ±10%, 1/2 w	745 1433 00
R140	RESISTOR, FIXED, COMPOSITION: 22, 000 ohms, ±10%, 1/4 w	745 0797 00
R142	RESISTOR, FIXED, COMPOSITION: 10, 000 ohms, ±10%, 1 w	745 3394 00
R143	RESISTOR, FIXED, COMPOSITION: 1500 ohms ±10% 1/2 w	745 1359 00
R144	RESISTOR, FIXED, COMPOSITION: 3300 ohms, ±10%, 1/2 w	745 1373 00
R146	RESISTOR, FIXED, WIREWOUND: 15, 000 ohms, ±10%, 7 w	710 9001 00
R148	RESISTOR, FIXED, COMPOSITION: 820 ohms, ±10%, 2 w	745 5649 00
R150, R172	RESISTOR, FIXED, COMPOSITION: 82 ohms, ±10%, 1/4 w	745 0710 00
R151, R124	RESISTOR, FIXED, COMPOSITION: 3900 ohms, ±10%, 1/4 w	745 0770 00
R152, R81	RESISTOR, FIXED, COMPOSITION: 5600 ohms, ±10%, 1/4 w	745 0776 00
R155, R156	RESISTOR, FIXED, COMPOSITION: 1. 5 megohms, ±10%, 1/2 w	745 1485 00
R158	RESISTOR, FIXED, COMPOSITION: 68 ohms, ±10%, 1/4 w	745 0707 00
*R161	RESISTOR, FIXED, COMPOSITION: 2700 ohms, ±10%, 1/2 w	745 1370 00
*R161	RESISTOR, FIXED, COMPOSITION: 3300 ohms, ±10%, 1/2 w	745 1373 00
*R161	RESISTOR, FIXED, COMPOSITION: 3900 ohms, ±10%, 1/2 w	745 1377 00
*R161	RESISTOR, FIXED, COMPOSITION: 4700 ohms, ±10%, 1/2 w	745 1380 00
R163	RESISTOR, FIXED, WIREWOUND: 6000 ohms, ±10%, 5 w	710 9118 00
R166	RESISTOR, FIXED, COMPOSITION: 1800 ohms, ±10%, 1/2 w	745 1363 00
R167	RESISTOR, FIXED, COMPOSITION: 470 ohms, ±10%, 1/2 w	745 1338 00
R173	RESISTOR, FIXED, COMPOSITION: 22 ohms, ±10%, 2 w	745 5582 00
S1	NOT USED	
S2	SWITCH, ROTARY: 1 circuit, 14 positions, 1 moving contact, 15 fixed contacts	269 2023 00
S3, S4, S5	SWITCH, ROTARY: 1 pole; 1 moving contact, 10 fixed contacts	269 2048 00
S6	SWITCH SECTION, ROTARY: 2 circuit, 14 positions, 2 moving contact,17 fixed contacts	269 1983 00
S7	SWITCH SECTION, ROTARY: 1 circuit, 14 positions, 1 section, 20 moving contacts, 20 fixed contacts	269 1981 00
S8	SWITCH SECTION, ROTARY: 1 circuit, 14 positions, 1 section, 2 moving contacts, 12 fixed contacts	269 1982 00
S9	SWITCH, ROTARY: 4 sections, 8 pole, 5 positions; 2 moving contacts, 12 fixed contacts	259 1076 00
S10	NOT USED	
S11	SWITCH, ROTARY: 1 section, 1 pole, 4 positions, 1 moving contact, 4 fixed contacts	259 1075 00
S12	SWITCH, ROTARY: 1 section, 2 pole, 3 positions, 2 moving contacts, 8 fixed contacts	259 1014 00
S13	SWITCH, ROTARY: 1 section, 1 pole, 14 positions, 1 moving contact, 15 fixed contacts	259 1081 00
T1	TRANSFORMER, INTERMEDIATE, FREQUENCY: 440 to 470 kc frequency range circuit application-interstage	278 0276 00
T2	TRANSFORMER INTERMEDIATE FREQUENCY: 3. 055 mc center frequency; 220 kc band pass at 3 db, attenuation 35 db min. from 2. 5 mc to 2. 7 mc	278 0293 00
T3	TRANSFORMER, RADIO FREQUENCY: 3 turns #28 AGW wire, single layer wound, 18 turns #26 AWG wire, single layer wound	544 9715 002
T4	TRANSFORMER, RADIO FREQUENCY: 12 turns #28 AWG wire	544 9712 002
T5	TRANSFORMER, INTERMEDIATE, FREQUENCY: 440 kc to 470 kc frequency range	278 0281 00
T6	TRANSFORMER, AUDIO FREQUENCY: plate coupling type, 8000 ohms primary; 500 ohms secondary w/4 ohm tap; primary 35 ma dc, secondary 0 dc; open frame	667 0368 00
V1, V3, V4	ELECTRON TUBE: triode-pentode; RCA type 6AZ8	255 0333 00
V2, V11, V12, V13	ELECTRON TUBE: triode-pentode; General Electric type 6U8A	255 0328 00
V5, V6	ELECTRON TUBE: glass envelope, twin triode; Tung-Sol Electronics type 12AT7	255 0205 00
V7	ELECTRON TUBE: glass envelope; pentode; Radio Corp. of America type 6DC6	255 0226 00
V8	ELECTRON TUBE: power pentode; RCA type 6CL6	255 0216 00
V9, V10	ELECTRON TUBE: pentode; RCA type 25L6	255 0101 00
V14, V17	ELECTRON TUBE: triode-diode; Sylvania type 6BN8	255 0335 00

*Chosen per operational requirement

KWM-2 Transceiver

ITEM	DESCRIPTION	COLLINS PART NO.
V15	ELECTRON TUBE: triode-diode; Sylvania type 6BJ8	255 0334 00
V16	ELECTRON TUBE: triode-pentode; Sylvania type 6EB8	255 0336 00
XDS1	LAMP HOLDER: miniature; bayonet; clip mounting	262 1210 00
XV1 thru XV4 XV12 thru XV17	SOCKET, ELECTRON TUBE: noval type; molded construction; low loss composition	220 1054 00
XV5, XV6, XV8, XV11	SOCKET, ELECTRON TUBE: 9 pin miniature; brass & copper w/plastic insulation	220 1103 00
XV7	SOCKET, ELECTRON TUBE: 7 pin miniature; tube socket; molded construction, plastic	220 1111 00
XV9, XV10	SOCKET, ELECTRON TUBE: 8 female contacts	220 1155 00
XY1	SOCKET, CRYSTAL: accommodates 14 crystals; silver pl copper contacts; phenolic body, 21/32 in. by 2-15/32 in. by 2-1/16 in.	544 2825 002
XY2	SOCKET, CRYSTAL: 2 regularly spaced contact positions, 0.486 in. c to c each contact 0.243 in. from center; cadmium plated phosphor bronze or beryllium copper	292 0082 00
Y1	CRYSTAL UNIT QUARTZ: 6.555 kc frequency	290 8728 00
Y2	CRYSTAL UNIT QUARTZ: 6.755 kc frequency	290 8729 00
Y3	CRYSTAL UNIT QUARTZ: 6.955 kc frequency	290 8730 00
Y4	CRYSTAL UNIT QUARTZ: 10.155 kc frequency	290 8731 00
Y5	CRYSTAL UNIT QUARTZ: 10.355 kc frequency	290 8732 00
Y6	CRYSTAL UNIT QUARTZ: 8.5775 kc frequency	290 8733 00
Y7	CRYSTAL UNIT QUARTZ: 8.6775 kc frequency	290 8734 00
Y8	CRYSTAL UNIT QUARTZ: 8.9775 kc frequency	290 8735 00
Y9	CRYSTAL UNIT QUARTZ: 12.0775 kc frequency	290 8736 00
Y10	CRYSTAL UNIT QUARTZ: 12.1775 kc frequency	290 8737 00
Y11	CRYSTAL UNIT QUARTZ: 12.2775 kc frequency	290 8738 00
Y12	CRYSTAL UNIT QUARTZ: 15,777.500 kc 1 sec, ±0.005% tolerance of frequency	290 9134 00
Y13	NOT SUPPLIED	
Y14	NOT SUPPLIED	
Y15	CRYSTAL UNIT QUARTZ: 100.000 kc	290 8454 00
Y16	CRYSTAL UNIT QUARTZ: 453.650 kc	290 8705 00
Y17	CRYSTAL UNIT QUARTZ: 456.350 kc	290 8706 00
Y18	NOT USED	
Y19 thru Y25	NOT SUPPLIED	
Z1, Z2	SUPPRESSOR, PARASITIC: 2 turns #18 AWG copper wire, 470 ohms, 2 w resistor; 0.318 in. dia by 0.688 in. lg	540 5641 00
Z3	OSCILLATOR 70K-2: c/o the 300 series; return equipment to Collins Radio Company for repair	522 1093 00
Z4	SUPPRESSOR, PARASITIC: 4 turns #26 AWG copper wire; 56 ohms, 10 w resistor; 0.250 in. lg, 0.090 in. dia	544 9698 00
Z5	TRAP, RADIO FREQUENCY: 9 to 11.5 mc tuning range; 10.5 mc; incl 15 uuf capacitor	278 0292 00
	70K-2 OSCILLATOR	522 1093 00
	70K-2 Oscillator consists of the following. This equipment should be returned to Collins Radio Company for repair.	
*C301	CAPACITOR, CERAMIC: 20 uuf ±5%, 500 vdcw	913 0053 00
*C301	CAPACITOR, CERAMIC: 20 uuf ±5%, 500 vdcw	913 0054 00
*C301	CAPACITOR, CERAMIC: 20 uuf ±5%, 500 vdcw	913 0055 00
*C301	CAPACITOR, CERAMIC: 20 uuf ±5%, 500 vdcw	913 0056 00
*C301	CAPACITOR, CERAMIC: 20 uuf ±5%, 500 vdcw	913 0057 00
*C301	CAPACITOR, CERAMIC: 20 uuf ±5%, 500 vdcw	913 0058 00
*C301	CAPACITOR, CERAMIC: 20 uuf ±5%, 500 vdcw	913 0232 00

*Chosen per operational requirement

ITEM	DESCRIPTION	COLLINS PART NO.
*C301	CAPACITOR, CERAMIC: 20 uuf ±5%, 500 vdcw	913 0233 00
*C301	CAPACITOR, CERAMIC: 20 uuf ±5%, 500 vdcw	913 0234 00
C302	CAPACITOR, MICA: 1000 uuf ±2%, 500 vdcw	912 1737 00
C303	CAPACITOR, MICA: 3000 uuf ±1%, 500 vdcw	912 1748 00
C304	CAPACITOR, MICA: 470 uuf ±2%, 300 vdcw	912 0541 00
**C305	CAPACITOR, CERAMIC: 100 uuf ±2%, 500 vdcw	913 0074 00
**C305	CAPACITOR, CERAMIC: 100 uuf ±2%, 500 vdcw	913 0246 00
C306, C307, C309	CAPACITOR, CERAMIC: 0.02 uf +60% -40%, 250 vdcw	913 2097 00
C308	CAPACITOR, VARIABLE, CERAMIC: 5 uuf min to 37.5 uuf max, 350 vdcw	917 1073 00
CR301	SEMICONDUCTOR DEVICE, DIODE: germanium; Sylvania part no. 1N34A	353 0103 00
L301	COIL, RADIO FREQUENCY: 22 turns #28 AWG double formvar, 2.4 uh inductance	240 0652 00
L302	TRIMMER ASSEMBLY: 9 turns #28 AWG wire, 1 toroid coil and hardware	543 7323 00
L303	INDUCTOR, TUNING: 10 turns #30 AWG wire	543 7333 003
L304	COIL, RADIO FREQUENCY: single layer wound, magnet wire, 3.30 uh	240 0695 00
R301, R303	RESISTOR, COMPOSITION: 0.10 megohms ±10%, 1/2 w	745 1436 00
R302	RESISTOR, COMPOSITION: 82,000 ohms ±5%, 1/2 w	745 1432 00
T301	TRANSFORMER, RADIO FREQUENCY: pri 380 uh nom 790 kc; sec 2.7 uh nom., 2.6 mc	240 0665 00
V301	ELECTRON TUBE: pentode; General Electric type 6AU6	255 0202 00
	516F-2 POWER SUPPLY	522 1170 00
C1	CAPACITOR, FIXED, PAPER: 0.05 uf ±10%, 1000 vdcw	961 4646 00
C2, C3, C4	CAPACITOR, FIXED, ELECTROLYTIC: 30 uf -10% +40%, 400 vdcw	183 1771 00
C5A, C5B	CAPACITOR, FIXED, ELECTROLYTIC: dual section, 15 uf -10% +40%, 400 v; 30 uf -10% +40%, 400 v	183 1781 00
C6	CAPACITOR, FIXED, DRY ELECTROLYTIC: 10 uf -15% +50%, 250 vdcw	183 1046 00
C7	CAPACITOR, FIXED, DRY ELECTROLYTIC: 10 uf -10% +100%, 150 vdcw	183 1040 00
CR1	RECTIFIER, METALLIC: selenium	353 0153 00
F1	FUSE, CARTRIDGE: 4 amps, 125 v, glass enclosed, 4 spares furnished	264 0217 00
L1, L2	REACTOR: 2 coils, 8.0 henrys, 150 ma dc, 200 ohms resistance, ea reactor	668 0300 00
L3	REACTOR: 1 coil, 0.92 henrys, 180 ma dc, 25 ohms resistance	668 0322 00
P1	CONNECTOR, RECEPTACLE, ELECTRICAL: 11 female socket contacts, Amphenol 78-S11T or Cinch 13786; mates w/Amphenol p/n 86CP11T Collins Radio p/n 372 1757 00 Shell for mating connector	372 1759 00
P2	ADAPTER, CONNECTOR: 2 mating ends, 3 contacts ea end, plastic dielectric, a-c plug 110 v, adapts 3 contact male plug to a 2 contact female receptacle	368 0110 00
R1, R2, R3	RESISTOR, FIXED, COMPOSITION: 270K ohms ±10%, 2 w	745 5754 00
R4, R5	RESISTOR, FIXED, WIREWOUND: 25K ohms ±5%, 11 w	710 0080 00
R6	RESISTOR, FIXED, WIREWOUND: 24K ohms ±5%, 25 w	710 0374 00
R7	RESISTOR, FIXED, COMPOSITION: 100 ohms ±10%, 1/2 w	745 1310 00
R8	RESISTOR, FIXED, COMPOSITION: 4700 ohms ±10%, 2 w	745 5680 00
R9	RESISTOR, VARIABLE, WIREWOUND: 2500 ohms ±10%, 2 w	750 0522 00
R10	RESISTOR, FIXED, COMPOSITION: 5600 ohms ±10%, 2 w	745 5684 00
T1	TRANSFORMER, POWER: pri 115 v 50/60 cps, sec. 6.3 5.0 v, 5.0 v, 275 v ct & tapped at 115V, 800 v ct	662 0434 00
V1	ELECTRON TUBE: type 5R4GYA	257 0142 00
V2	ELECTRON TUBE: type 5U4GB	257 0109 00
XF1	FUSEHOLDER: extractor post type, 125 v, 5 amp, accommodates 3AG cartridge fuse	265 1002 00
XV1, XV2	SOCKET, ELECTRON TUBE: 8 contact, octal, phenolic insulation	220 1155 00

**Selected in final test

GENERAL COVERAGE CRYSTALS AVAILABLE

CRYSTAL FREQUENCY (kc) FOR	OPERATING FREQUENCY (mc)	PART NUMBER	CRYSTAL FREQUENCY (kc) FOR	OPERATING FREQUENCY (mc)	PART NUMBER	CRYSTAL FREQUENCY (kc) FOR	OPERATING FREQUENCY (mc)	PART NUMBER
6555.000	3.4-3.6	290 9009 00	8477.500	13.8-14.0	290 9061 00	12877.500	22.6-22.8	290 9105 00
6755.000	3.6-3.8	290 9010 00	8577.500	14.0-14.2	290 9062 00	12977.500	22.8-23.0	290 9106 00
6955.000	3.8-4.0	290 9011 00	8677.500	14.2-14.4	290 9063 00	13077.500	23.0-23.2	290 9107 00
7155.000	4.0-4.2	290 9012 00	8777.500	14.4-14.6	290 9064 00	13177.500	23.2-23.4	290 9108 00
7355.000	4.2-4.4	290 9013 00	8877.500	14.6-14.8	290 9065 00	13277.500	23.4-23.6	290 9109 00
7555.000	4.4-4.6	290 9014 00	8977.500	14.8-15.0	290 9066 00	13377.500	23.6-23.8	290 9110 00
7755.000	4.6-4.8	290 9015 00	9077.500	15.0-15.2	290 9067 00	13477.500	23.8-24.0	290 9111 00
7955.000	4.8-5.0	290 9016 00	9177.500	15.2-15.4	290 9068 00	13577.500	24.0-24.2	290 9112 00
9755.000	6.6-6.8	290 9025 00	9277.500	15.4-15.6	290 9069 00	13677.500	24.2-24.4	290 9113 00
9955.000	6.8-7.0	290 9026 00	9377.500	15.6-15.8	290 9070 00	13777.500	24.4-24.6	290 9114 00
10155.000	7.0-7.2	290 9027 00	9477.500	15.8-16.0	290 9071 00	13877.500	24.6-24.8	290 9115 00
10355.000	7.2-7.4	290 9028 00	9577.500	16.0-16.2	290 9072 00	13977.500	24.8-25.0	290 9116 00
10555.000	7.4-7.6	290 9029 00	9677.500	16.2-16.4	290 9073 00	14077.500	25.0-25.2	290 9117 00
10755.000	7.6-7.8	290 9030 00	9777.500	16.4-16.6	290 9074 00	14177.500	25.2-25.4	290 9118 00
10955.000	7.8-8.0	290 9031 00	9877.500	16.6-16.8	290 9075 00	14277.500	25.4-25.6	290 9119 00
11155.000	8.0-8.2	290 9032 00	9977.500	16.8-17.0	290 9076 00	14377.500	25.6-25.8	290 9120 00
11355.000	8.2-8.4	290 9033 00	10077.500	17.0-17.2	290 9077 00	14477.500	25.8-26.0	290 9121 00
11555.000	8.4-8.6	290 9034 00	10177.500	17.2-17.4	290 9078 00	14577.500	26.0-26.2	290 9122 00
11755.000	8.6-8.8	290 9035 00	10277.500	17.4-17.6	290 9079 00	14677.500	26.2-26.4	290 9123 00
11955.000	8.8-9.0	290 9036 00	10377.500	17.6-17.8	290 9080 00	14777.500	26.4-26.6	290 9124 00
12155.000	9.0-9.2	290 9037 00	10477.500	17.8-18.0	290 9081 00	14877.500	26.6-26.8	290 9125 00
12355.000	9.2-9.4	290 9038 00	10577.500	18.0-18.2	290 9082 00	14977.500	26.8-27.0	290 9126 00
12555.000	9.4-9.6	290 9039 00	10677.500	18.2-18.4	290 9083 00	15077.500	27.0-27.2	290 9127 00
12755.000	9.6-9.8	290 9040 00	10777.500	18.4-18.6	290 9084 00	15177.500	27.2-27.4	290 9128 00
12955.000	9.8-9.10	290 9041 00	10877.500	18.6-18.8	290 9085 00	15277.500	27.4-27.6	290 9129 00
13155.000	10.0-10.2	290 9042 00	10977.500	18.8-19.0	290 9086 00	15377.500	27.6-27.8	290 9130 00
13355.000	10.2-10.4	290 9043 00	11077.500	19.0-19.2	290 9087 00	15477.500	27.8-28.0	290 9131 00
13555.000	10.4-10.6	290 9044 00	11177.500	19.2-19.4	290 9088 00	15527.500	27.9-28.1	290 9142 00
13755.000	10.6-10.8	290 9045 00	11277.500	19.4-19.6	290 9089 00	15577.500	28.0-28.2	290 9132 00
13955.000	10.8-11.0	290 9046 00	11377.500	19.6-19.8	290 9090 00	15627.500	28.1-28.3	290 9143 00
14155.000	11.0-11.2	290 9047 00	11477.500	19.8-20.0	290 9091 00	15677.500	28.2-28.4	290 9133 00
14355.000	11.2-11.4	290 9048 00	11577.500	20.0-20.2	290 9092 00	15727.500	28.3-28.5	290 9144 00
14555.000	11.4-11.6	290 9049 00	11677.500	20.2-20.4	290 9093 00	15777.500	28.4-28.6	290 9134 00
14755.000	11.6-11.8	290 9050 00	11777.500	20.4-20.6	290 9094 00	15877.500	28.6-28.8	290 9135 00
14955.000	11.8-12.0	290 9051 00	11877.500	20.6-20.8	290 9095 00	15927.500	28.7-28.9	290 9145 00
7577.500	12.0-12.2	290 9052 00	11977.500	20.8-21.0	290 9096 00	15977.500	28.8-29.0	290 9136 00
7677.500	12.2-12.4	290 9053 00	12077.500	21.0-21.2	290 9097 00	16027.500	28.9-29.1	290 9146 00
7777.500	12.4-12.6	290 9054 00	12177.500	21.2-21.4	290 9098 00	16077.500	29.0-29.2	290 9137 00
7877.500	12.6-12.8	290 9055 00	12277.500	21.4-21.6	290 9099 00	16127.500	29.1-29.3	290 9147 00
7977.500	12.8-13.0	290 9056 00	12377.500	21.6-21.8	290 9100 00	16177.500	29.2-29.4	290 9138 00
8077.500	13.0-13.2	290 9057 00	12477.500	21.8-22.0	290 9101 00	16227.500	29.3-29.5	290 9148 00
8177.500	13.2-13.4	290 9058 00	12577.500	22.0-22.2	290 9102 00	16277.500	29.4-29.6	290 9139 00
8277.500	13.4-13.6	290 9059 00	12677.500	22.2-22.4	290 9103 00	16327.500	29.5-29.7	290 9149 00
8377.500	13.6-13.8	290 9060 00	12777.500	22.4-22.6	290 9104 00	16377.500	29.6-29.8	290 9140 00
						16477.500	29.8-30.0	290 9141 00

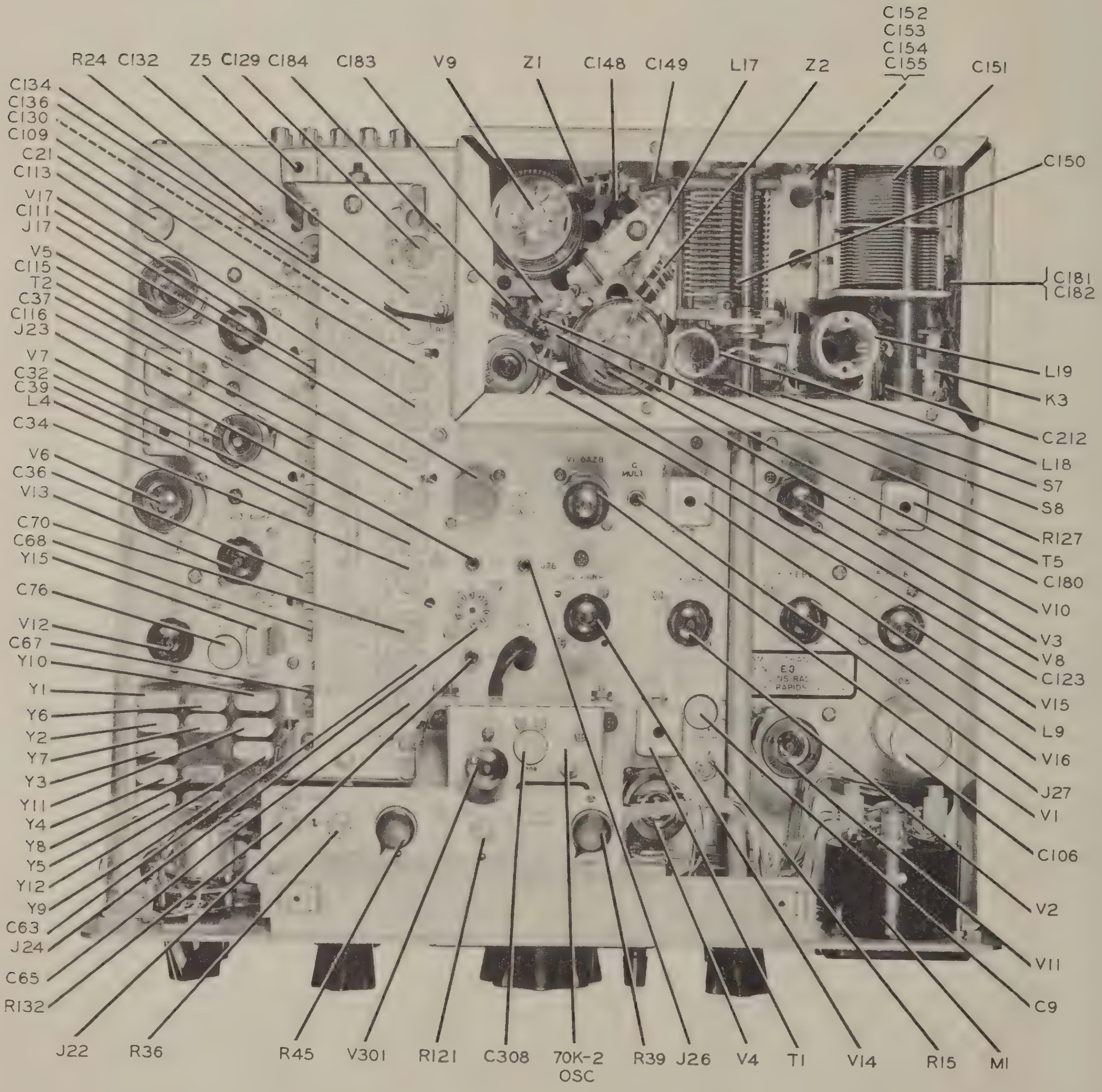


Figure 6-1. Top Chassis, Parts Identification

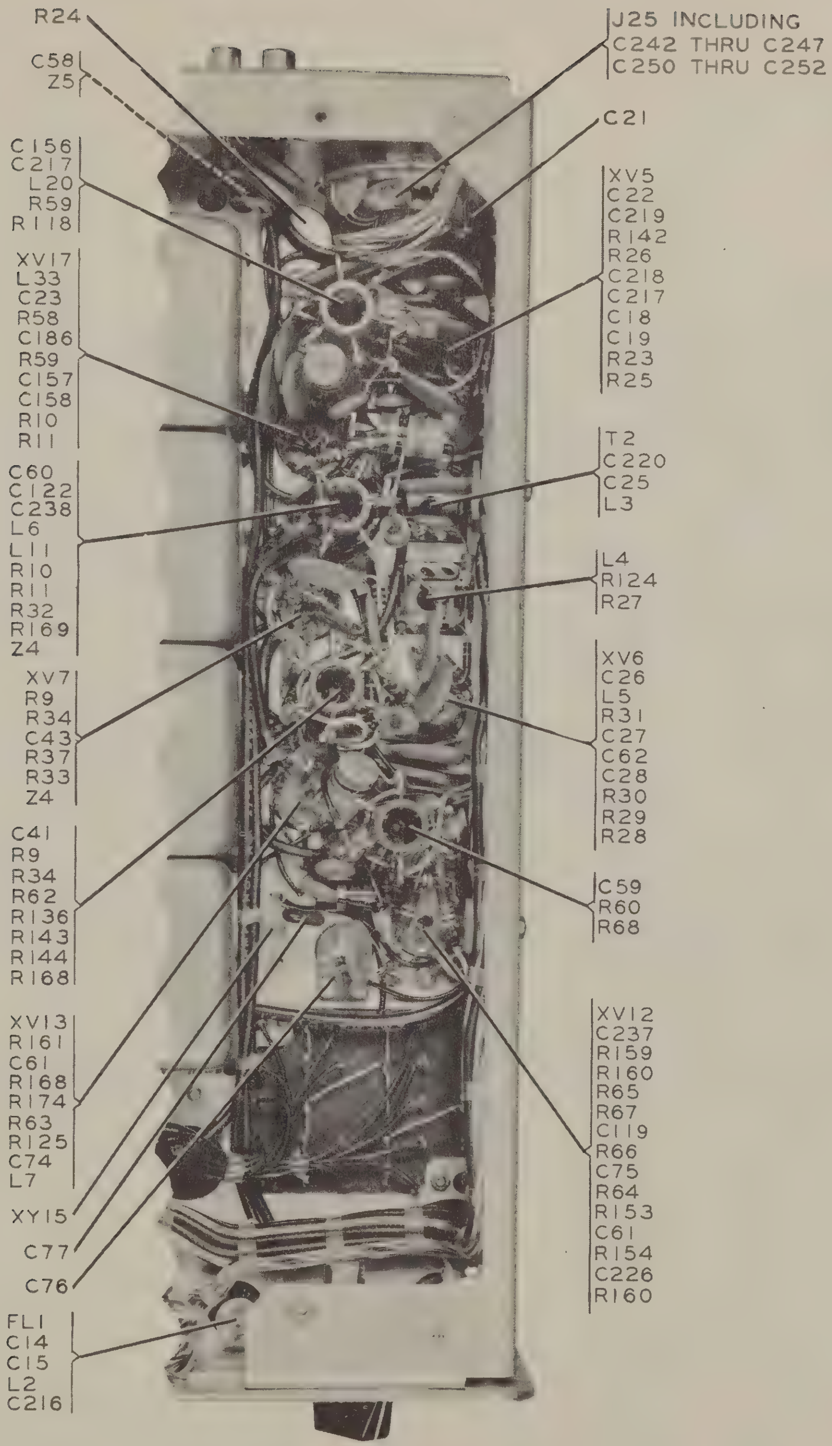


Figure 6-2. Bottom Right View, Parts Identification

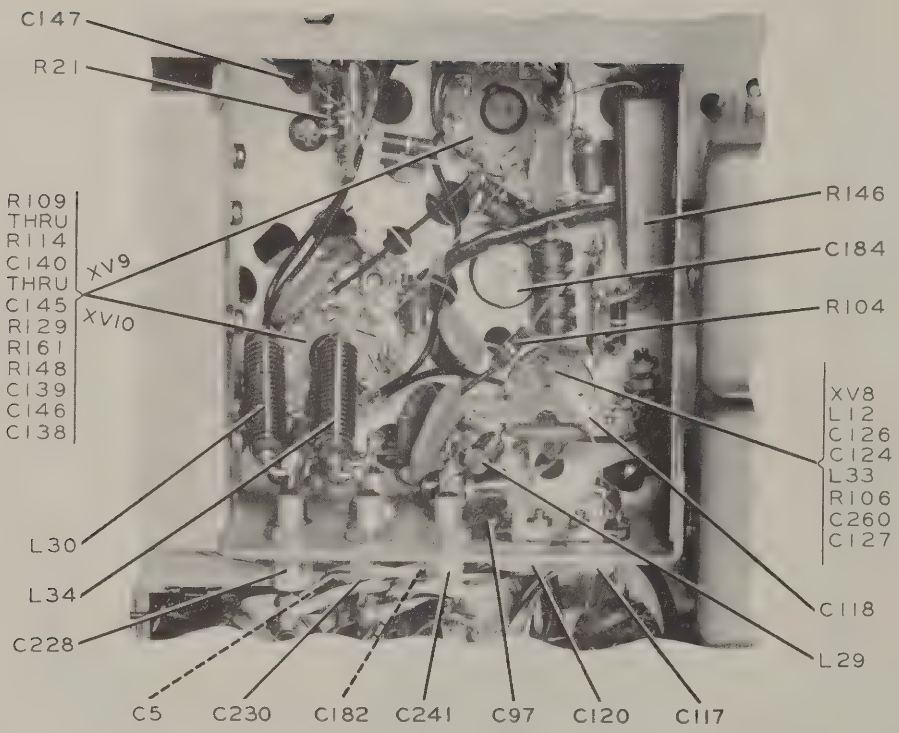


Figure 6-3. PA and Driver Grid Compartment, Parts Identification, Bottom View

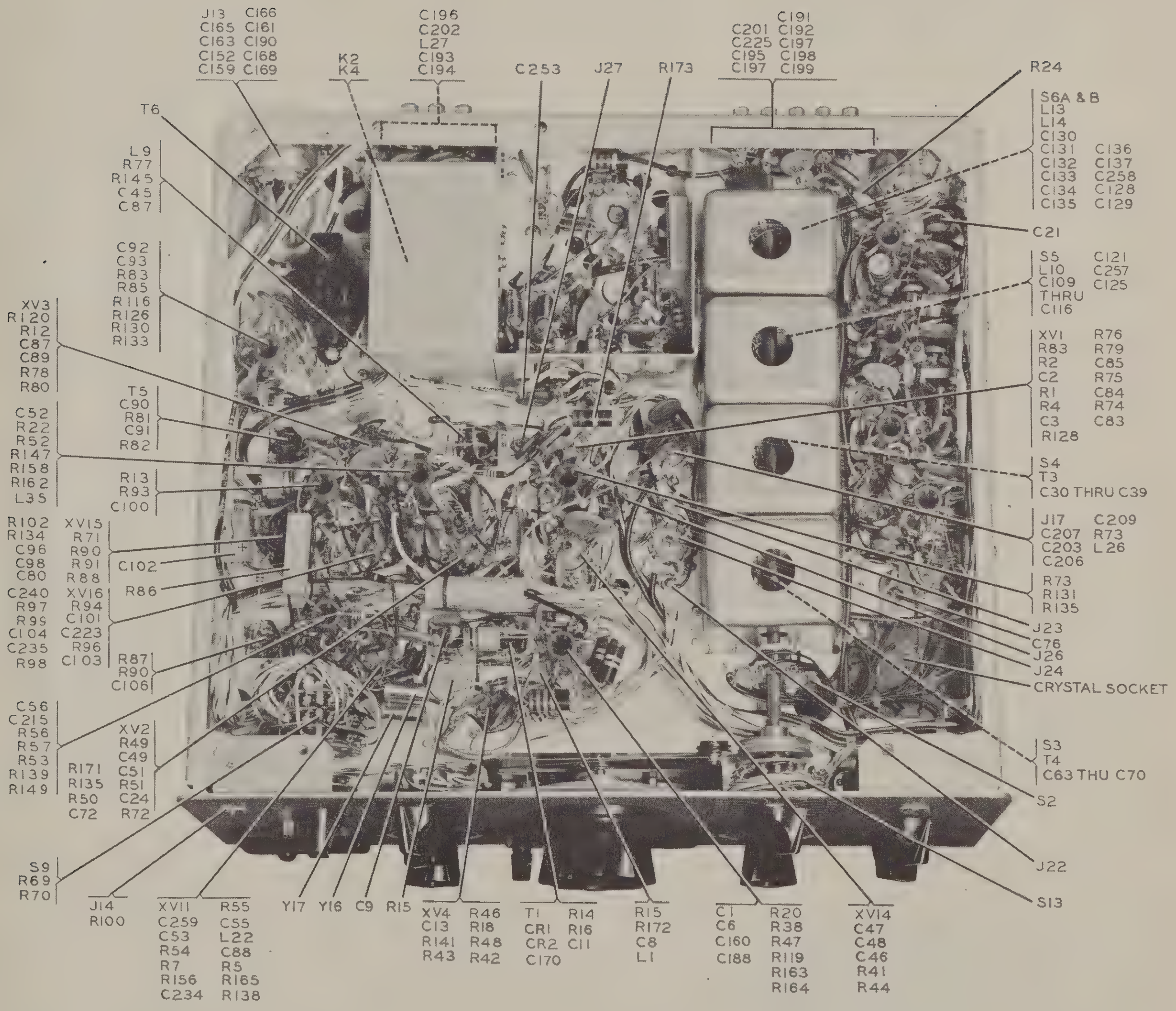
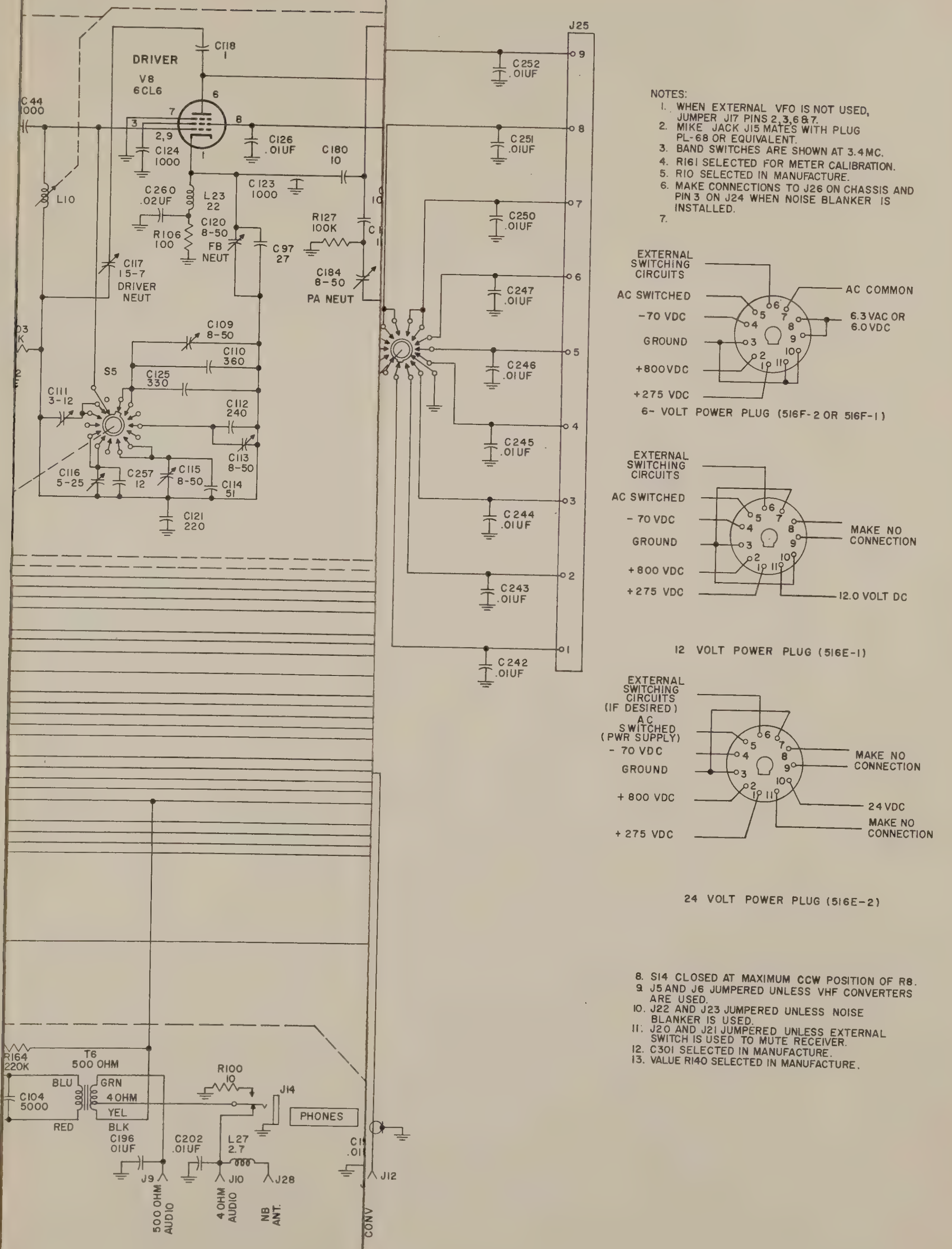


Figure 6-4. Bottom Left View, Parts Identification

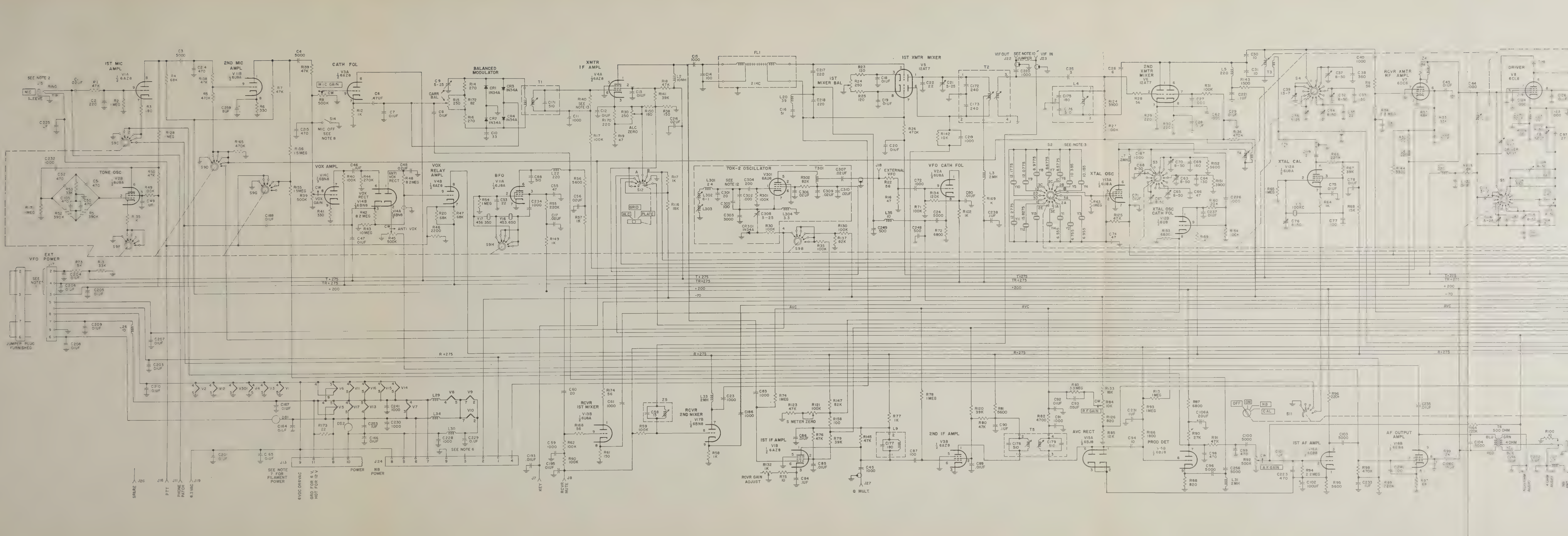
SECTION VII
ILLUSTRATIONS



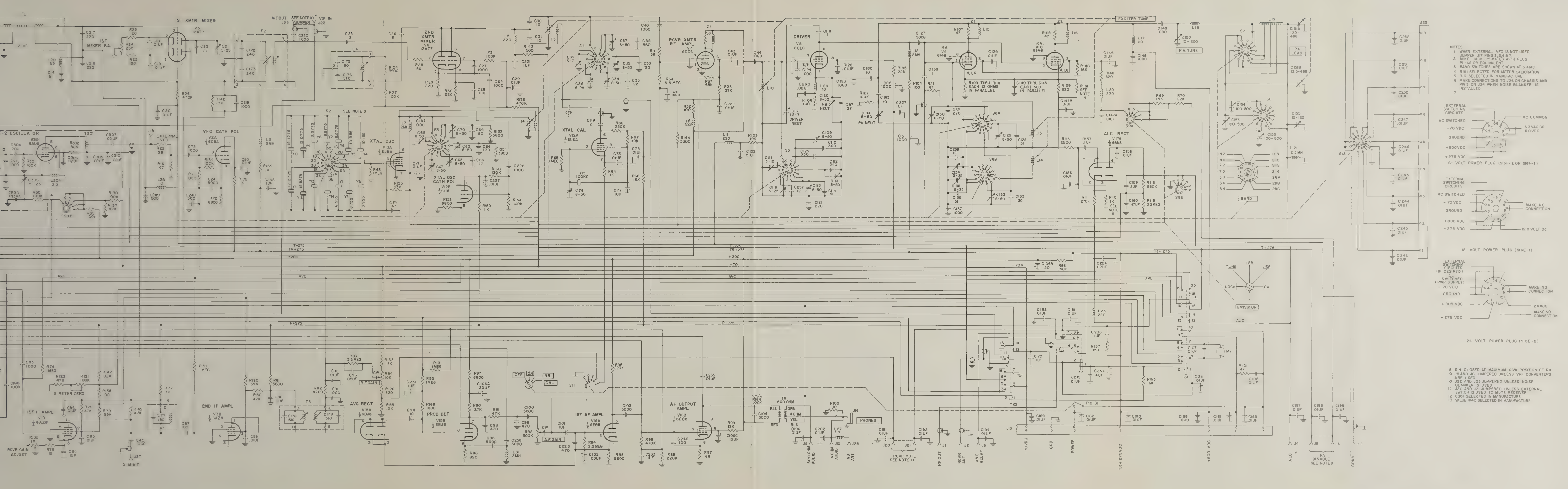
NOTES:
1. WHEN EXTERNAL VFO IS NOT USED, JUMPER J17 PINS 2,3,6 & 7.
2. MIKE JACK J15 MATES WITH PLUG PL-68 OR EQUIVALENT.
3. BAND SWITCHES ARE SHOWN AT 3.4MC.
4. R161 SELECTED FOR METER CALIBRATION.
5. R10 SELECTED IN MANUFACTURE.
6. MAKE CONNECTIONS TO J26 ON CHASSIS AND PIN 3 ON J24 WHEN NOISE BLANKER IS INSTALLED.
7.

8. S14 CLOSED AT MAXIMUM CCW POSITION OF R8.
9. J5 AND J6 JUMPERED UNLESS VHF CONVERTERS ARE USED.
10. J22 AND J23 JUMPERED UNLESS NOISE BLANKER IS USED.
11. J20 AND J21 JUMPERED UNLESS EXTERNAL SWITCH IS USED TO MUTE RECEIVER.
12. C301 SELECTED IN MANUFACTURE.
13. VALUE R140 SELECTED IN MANUFACTURE.

7-1. KWM-2 Transceiver, Schematic Diagram


1ST MIC AMPL
V1A 6AZ8
2ND MIC AMPL
V11B 6U8A
CATH FOL
V3A 6AZ8
MIC GAIN
MIC OFF SEE NOTE 8
BALANCED MODULATOR
CARR BAL
T1
XMTR IF AMPL
V4A 6AZ8
FL1
2 KC
1ST MIXER BAL
1ST XMTR MIXER
V5 12AT7
T2
VFO OUT J22
SEE NOTE 10 JUMPER
VIF IN J23
2ND XMTR MIXER
V6 12AT7
T3
S4
RCVR XMTR RF AMPL
V7 6DC6
DRIVER
V8 6CL6
TONE OSC
V2B 6U8A
VOX AMPL
V14C 6BN8
VOX GAIN
VOX RECT
V14B 6BN8
ANTI VOX
VOX RELAY AMPL
V4B 6AZ8
BFO
V11A 6J8A
ALC ZERO
GRID
ALC
PLATE
S12
70K-2 OSCILLATOR
V301 6AU6
EXTERNAL VFO
VFO CATH FOL
V2A 6U8A
S2
SEE NOTE 3
XTAL OSC
V13A 6U8A
XTAL OSC CATH FOL
XTAL CAL
V12A 6U8A
S1
VFO POWER
EXT
SEE NOTE 1
JUMPER PLUG FURNISHED
T+275
TR+275
+200
-70
AVC
R+275
RCVR 1ST MIXER
V13B 6U8A
Z5
RCVR 2ND MIXER
V17B 6BN8
S METER ZERO
1ST IF AMPL
V18 6AZ8
RCVR GAIN ADJUST
Q MULT.
L9
2ND IF AMPL
V3B 6AZ8
T5
AVC RECT
V15A 6BJ8
R.F. GAIN
PROD DET
V15 6BJ8
OFF
ON
RB
CAL
S11
A.F. GAIN
1ST AF AMPL
V16A 6EB8
AF OUTPUT AMPL
V16B 6EB8
T6
500 OHM
4 OHM
J13
SEE NOTE 7 FOR FILAMENT POWER
6VDC OR 6VAC
GRD FOR 6 V. HOT FOR 12 V.
POWER
J24
RB POWER
SEE NOTE 6
SPARE
PTT
PHONE PATCH
6.3 VAC
KEY
RCVR MUTE
J7
J8
J20
J16
J11
J19
J27

SECTION VII
ILLUSTRATIONS



NOTES
1 WHEN EXTERNAL VFO IS NOT USED, JUMPER J17 PINS 2,3,6 & 7.
2 MIKE JACK J15 MATES WITH PLUG PL-68 OR EQUIVALENT
3 BAND SWITCHES ARE SHOWN AT 3 4 MC
4 R161 SELECTED FOR METER CALIBRATION
5 R10 SELECTED IN MANUFACTURE.
6 MAKE CONNECTIONS TO J26 ON CHASSIS AND PIN 3 ON J24 WHEN NOISE BLANKER IS INSTALLED
7
8 S14 CLOSED AT MAXIMUM CCW POSITION OF R8
9 J5 AND J6 JUMPERED UNLESS VHF CONVERTERS ARE USED
10 J22 AND J23 JUMPERED UNLESS NOISE BLANKER IS USED
11 J20 AND J21 JUMPERED UNLESS EXTERNAL SWITCH IS USED TO MUTE RECEIVER
12 C301 SELECTED IN MANUFACTURE
13 VALUE R140 SELECTED IN MANUFACTURE

Figure 7-1. KWM-2 Transceiver, Schematic Diagram

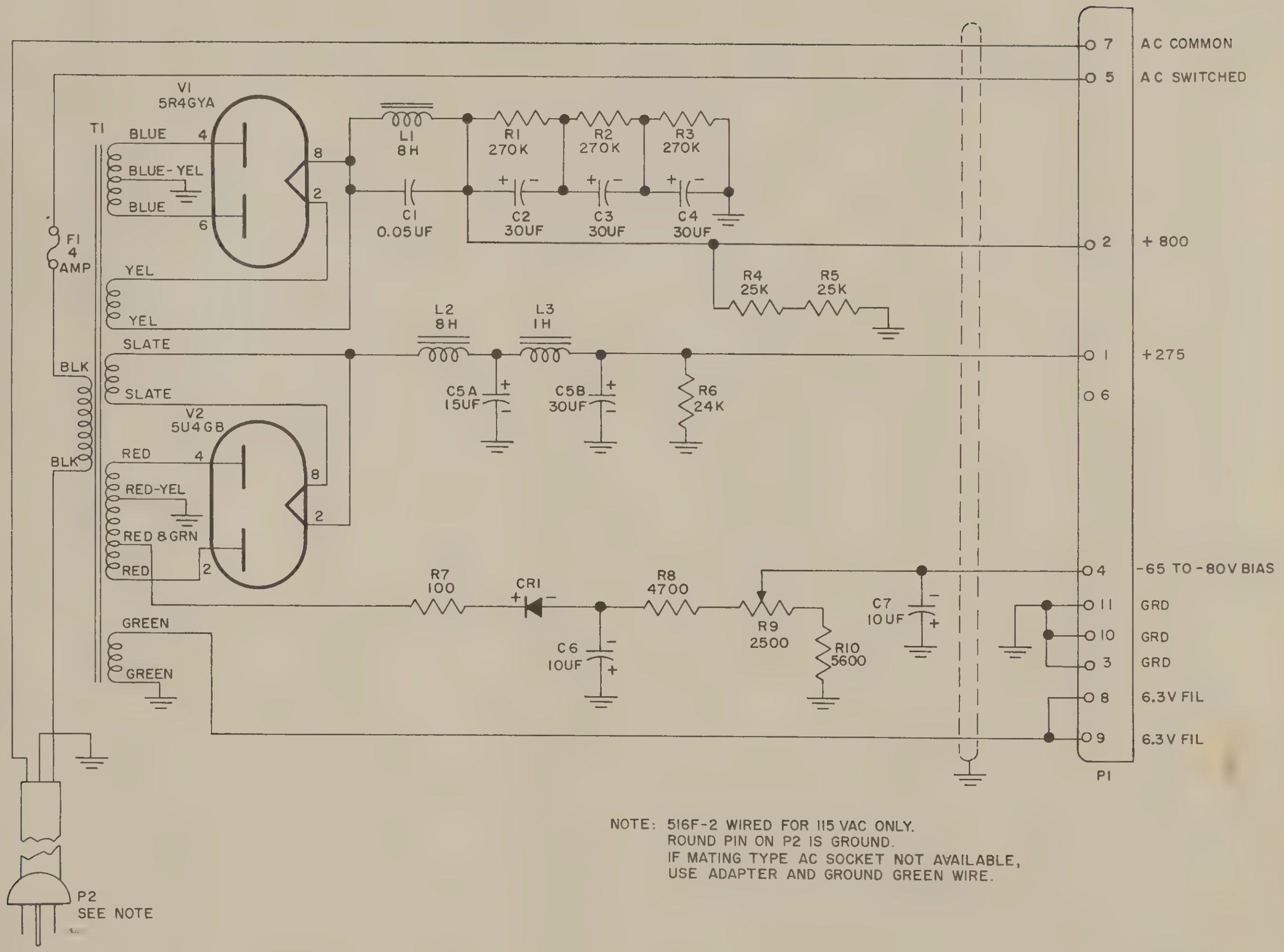


Figure 7-2. 516F-2 Power Supply, Schematic Diagram

HOOK-UP WIRE CODE

The characteristics of the hook-up wire used in this equipment are indicated by groups of symbols on the diagrams. Each symbol group consists of a maximum of three letters followed by a maximum of three numerals. When three letters are used the first indicates the type of wire, the second represents the size of wire, and the third is the letter "S", used only when the wire is shielded. When two letters are used, the first and second letters indicate either the type and size of wire or the size of wire and shielding, respectively. When one letter is used it indicates the wire size only. The first numeral indicates the color of the wire body and the second and third numerals, if any, represent the colors of tracers, all numerals being in accordance with the standard EIA and MIL-W-16878 color code.

The symbols are assigned according to the following table.

TYPE OF WIRE CODE	
LETTER	TYPE OF WIRE
A	Cotton Braid Over Plastic (Formerly AN-J-C-48)
B	Busbar, Round Tinned
C	MIL-W-16878 Type B (#20 and Larger) (600 Volts)
D	Miniature Wire, MIL-W-16878 Type B (#22 and Smaller)
E	
F	Extra Flexible Varnished Cambric
G	
H	Kel-F (Monochlorotrifluoroethylene)
J	
K	Neon Sign Cable (15,000 Volts)
L	Silicone
M	
N	Single Conductor Stranded (Not Rubber Covered)
P	Single Conductor Stranded (Rubber Covered)
Q	
R	MIL-W-16878 Type C (1000 Volts)
T	Teflon, MIL-W-16878 Type E (600 Volts)
V	MIL-W-16878 Type D (3000 Volts)
W	Teflon, MIL-W-16878 Type EE (1000 Volts)
X	
Y	
Z	Acetate Yarn, Telephone Type

SIZE OF WIRE CODE	
LETTER	SIZE
A	#22 AWG
B	#20
C	#18
D	#16
E	#14
F	#12
G	#10
H	#8
J	#6
K	#4
L	#2
M	#1
N	#0
P	#00
Q	#000
R	#0000
T	#28
V	#26
W	#24
X	#19
Y	#30
Z	

COLOR CODE	
NUMBER OR LETTER	COLOR
0	Black
1	Brown
2	Red
3	Orange
4	Yellow
5	Green
6	Blue
7	Violet
8	Gray (Slate)
9	White
a	Clear
b	Tan
c	Pink
d	Maroon
e	Light Green
f	Light Blue

EXAMPLES

MIL TYPE C, #22AWG, UNSHIELDED WIRE, WHITE WITH RED AND GREEN TRACERS:

R	A	9	25	4-1/4
Type of Wire	Size of Wire	Color of Body	Color of Tracers --	Length of Wire in Inches (Includes Stripping & Tinning)

MIL TYPE C, #16AWG, SHIELDED WIRE (SINGLE), WHITE WITH RED AND GREEN TRACERS:

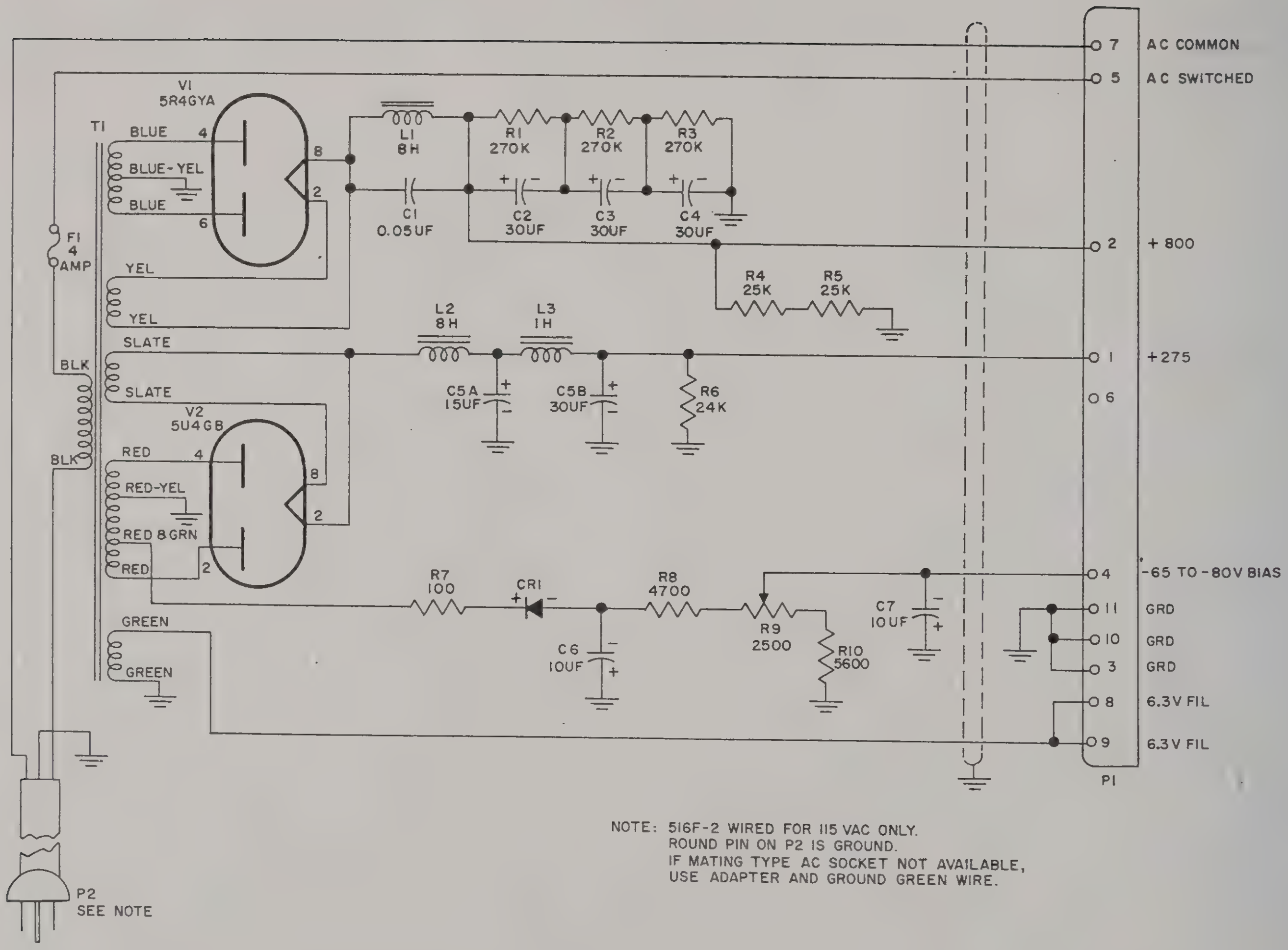
R	D	S	9	25	4-1/4
Type of Wire	Size of Wire	Shielded	Color of Body	Color of Tracers --	Length of Wire in Inches (Includes Stripping & Tinning)

MIL TYPE B, #22AWG, SHIELDED WIRE (MULTIPLE), WHITE, AND WHITE WITH RED TRACER:

D	A	S	(9)	(92)	4-1/4
Type of Wire	Size of Wire	Shielded	First Conductor	Second Conductor --	Length of Wire in Inches (Includes Stripping & Tinning)

COLLINS

COLLINS RADIO COMPANY



NOTE: 516F-2 WIRED FOR 115 VAC ONLY.
ROUND PIN ON P2 IS GROUND.
IF MATING TYPE AC SOCKET NOT AVAILABLE,
USE ADAPTER AND GROUND GREEN WIRE.

Figure 7-2. 516F-2 Power Supply, Schematic Diagram

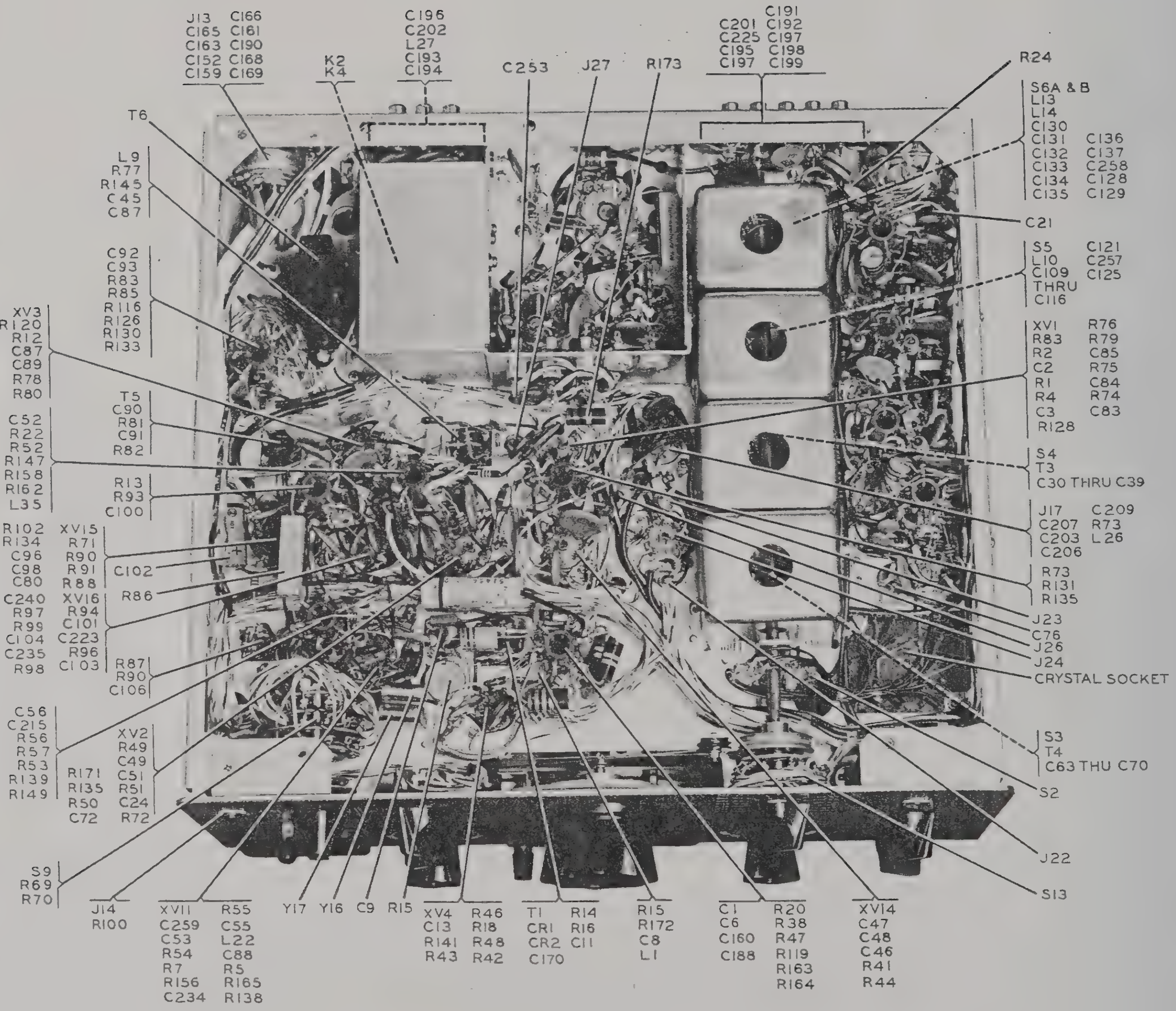


Figure 6-4. Bottom Left View, Parts Identification

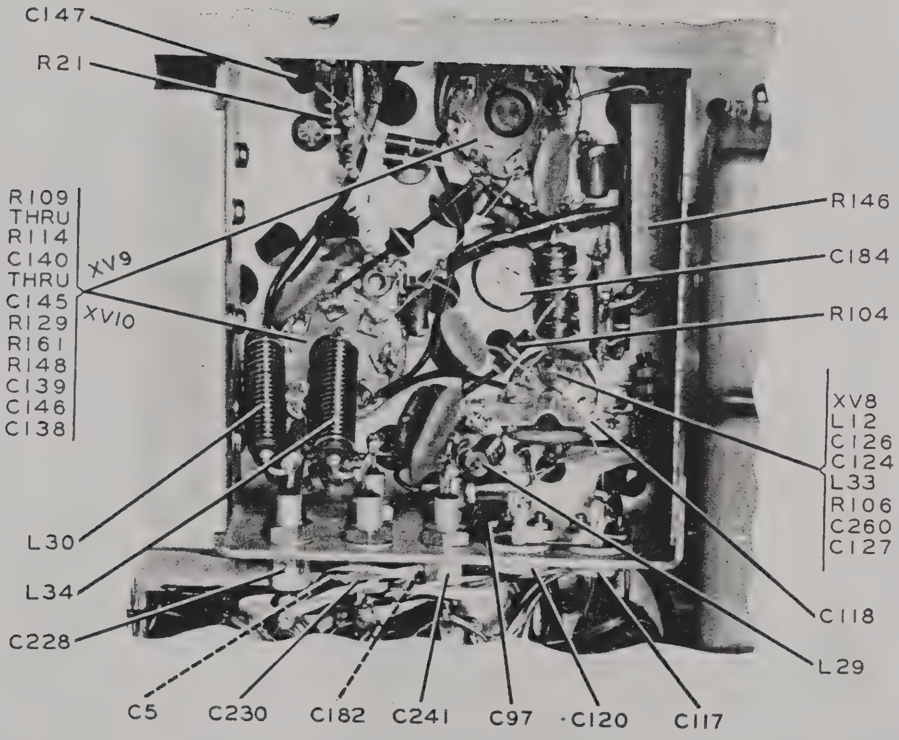


Figure 6-3. PA and Driver Grid Compartment, Parts Identification, Bottom View

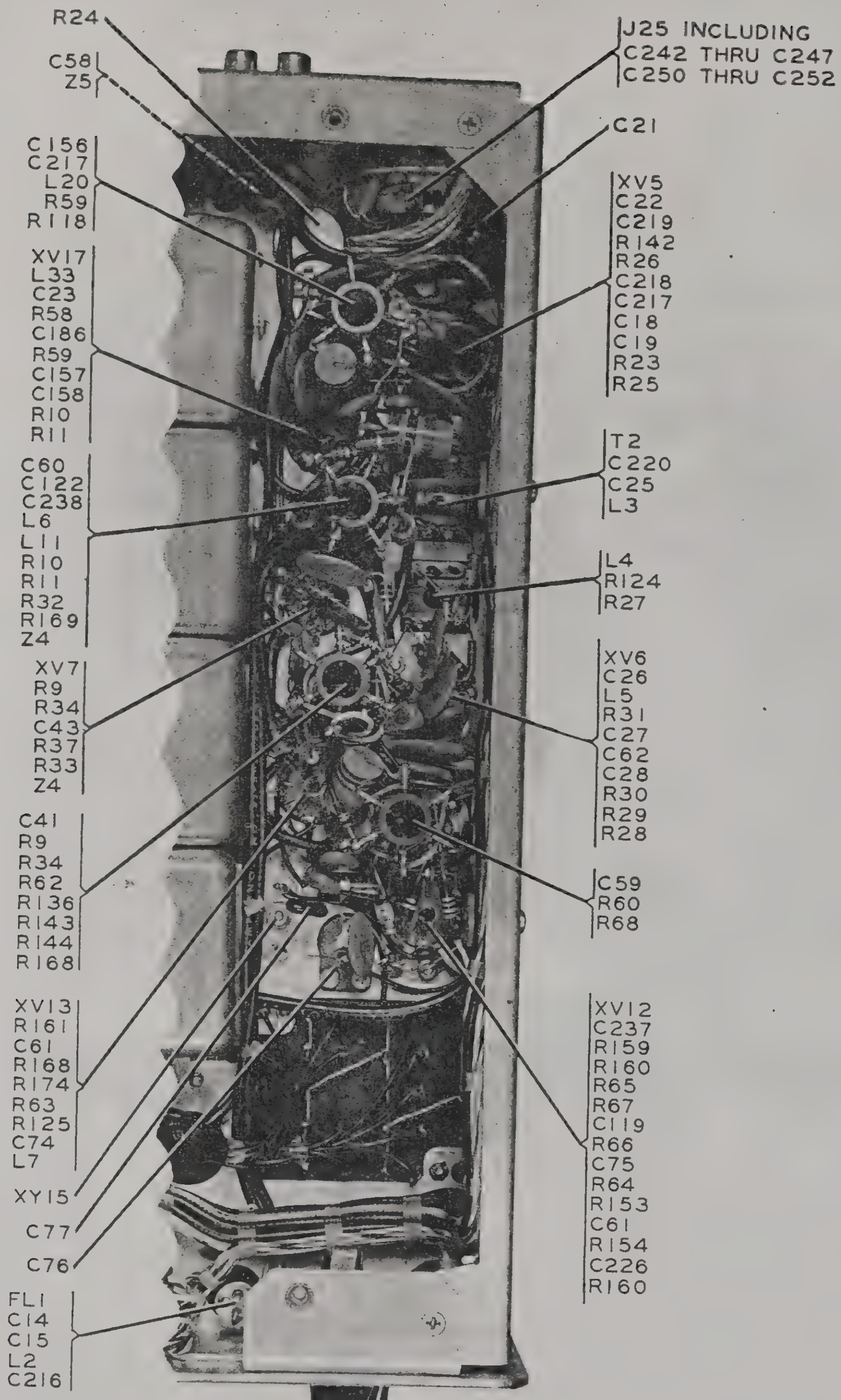


Figure 6-2. Bottom Right View, Parts Identification

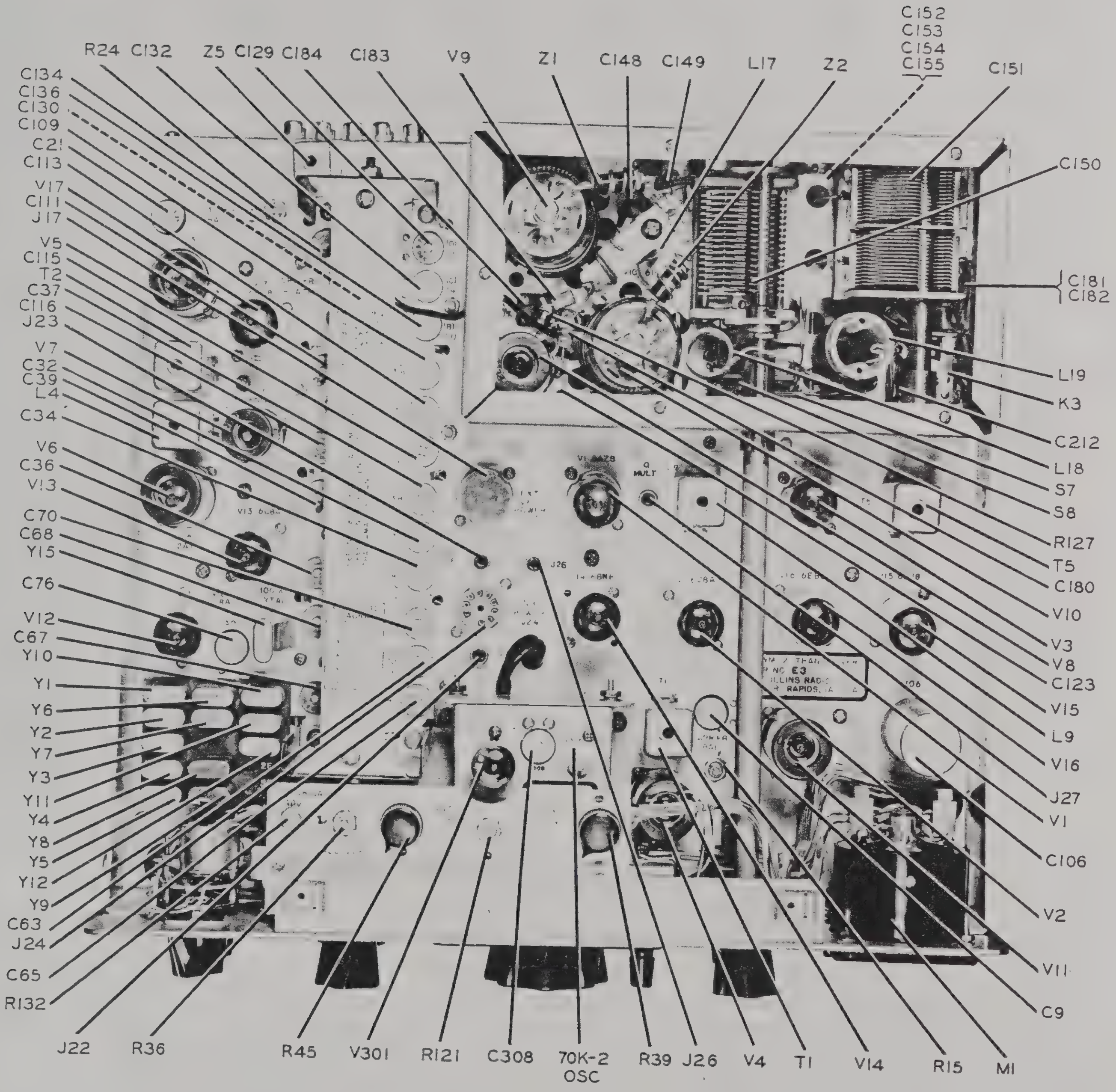


Figure 6-1. Top Chassis, Parts Identification

GENERAL COVERAGE CRYSTALS AVAILABLE

CRYSTAL FREQUENCY (kc)	FOR OPERATING FREQUENCY (mc)	PART NUMBER	CRYSTAL FREQUENCY (kc)	FOR OPERATING FREQUENCY (mc)	PART NUMBER	CRYSTAL FREQUENCY (kc)	FOR OPERATING FREQUENCY (mc)	PART NUMBER
6555.000	3.4-3.6	290 9009 00	8477.500	13.8-14.0	290 9061 00	12877.500	22.6-22.8	290 9105 00
6755.000	3.6-3.8	290 9010 00	8577.500	14.0-14.2	290 9062 00	12977.500	22.8-23.0	290 9106 00
6955.000	3.8-4.0	290 9011 00	8677.500	14.2-14.4	290 9063 00	13077.500	23.0-23.2	290 9107 00
7155.000	4.0-4.2	290 9012 00	8777.500	14.4-14.6	290 9064 00	13177.500	23.2-23.4	290 9108 00
7355.000	4.2-4.4	290 9013 00	8877.500	14.6-14.8	290 9065 00	13277.500	23.4-23.6	290 9109 00
7555.000	4.4-4.6	290 9014 00	8977.500	14.8-15.0	290 9066 00	13377.500	23.6-23.8	290 9110 00
7755.000	4.6-4.8	290 9015 00	9077.500	15.0-15.2	290 9067 00	13477.500	23.8-24.0	290 9111 00
7955.000	4.8-5.0	290 9016 00	9177.500	15.2-15.4	290 9068 00	13577.500	24.0-24.2	290 9112 00
9755.000	6.6-6.8	290 9025 00	9277.500	15.4-15.6	290 9069 00	13677.500	24.2-24.4	290 9113 00
9955.000	6.8-7.0	290 9026 00	9377.500	15.6-15.8	290 9070 00	13777.500	24.4-24.6	290 9114 00
10155.000	7.0-7.2	290 9027 00	9477.500	15.8-16.0	290 9071 00	13877.500	24.6-24.8	290 9115 00
10355.000	7.2-7.4	290 9028 00	9577.500	16.0-16.2	290 9072 00	13977.500	24.8-25.0	290 9116 00
10555.000	7.4-7.6	290 9029 00	9677.500	16.2-16.4	290 9073 00	14077.500	25.0-25.2	290 9117 00
10755.000	7.6-7.8	290 9030 00	9777.500	16.4-16.6	290 9074 00	14177.500	25.2-25.4	290 9118 00
10955.000	7.8-8.0	290 9031 00	9877.500	16.6-16.8	290 9075 00	14277.500	25.4-25.6	290 9119 00
11155.000	8.0-8.2	290 9032 00	9977.500	16.8-17.0	290 9076 00	14377.500	25.6-25.8	290 9120 00
11355.000	8.2-8.4	290 9033 00	10077.500	17.0-17.2	290 9077 00	14477.500	25.8-26.0	290 9121 00
11555.000	8.4-8.6	290 9034 00	10177.500	17.2-17.4	290 9078 00	14577.500	26.0-26.2	290 9122 00
11755.000	8.6-8.8	290 9035 00	10277.500	17.4-17.6	290 9079 00	14677.500	26.2-26.4	290 9123 00
11955.000	8.8-9.0	290 9036 00	10377.500	17.6-17.8	290 9080 00	14777.500	26.4-26.6	290 9124 00
12155.000	9.0-9.2	290 9037 00	10477.500	17.8-18.0	290 9081 00	14877.500	26.6-26.8	290 9125 00
12355.000	9.2-9.4	290 9038 00	10577.500	18.0-18.2	290 9082 00	14977.500	26.8-27.0	290 9126 00
12555.000	9.4-9.6	290 9039 00	10677.500	18.2-18.4	290 9083 00	15077.500	27.0-27.2	290 9127 00
12755.000	9.6-9.8	290 9040 00	10777.500	18.4-18.6	290 9084 00	15177.500	27.2-27.4	290 9128 00
12955.000	9.8-9.10	290 9041 00	10877.500	18.6-18.8	290 9085 00	15277.500	27.4-27.6	290 9129 00
13155.000	10.0-10.2	290 9042 00	10977.500	18.8-19.0	290 9086 00	15377.500	27.6-27.8	290 9130 00
13355.000	10.2-10.4	290 9043 00	11077.500	19.0-19.2	290 9087 00	15477.500	27.8-28.0	290 9131 00
13555.000	10.4-10.6	290 9044 00	11177.500	19.2-19.4	290 9088 00	15527.500	27.9-28.1	290 9142 00
13755.000	10.6-10.8	290 9045 00	11277.500	19.4-19.6	290 9089 00	15577.500	28.0-28.2	290 9132 00
13955.000	10.8-11.0	290 9046 00	11377.500	19.6-19.8	290 9090 00	15627.500	28.1-28.3	290 9143 00
14155.000	11.0-11.2	290 9047 00	11477.500	19.8-20.0	290 9091 00	15677.500	28.2-28.4	290 9133 00
14355.000	11.2-11.4	290 9048 00	11577.500	20.0-20.2	290 9092 00	15727.500	28.3-28.5	290 9144 00
14555.000	11.4-11.6	290 9049 00	11677.500	20.2-20.4	290 9093 00	15777.500	28.4-28.6	290 9134 00
14755.000	11.6-11.8	290 9050 00	11777.500	20.4-20.6	290 9094 00	15877.500	28.6-28.8	290 9135 00
14955.000	11.8-12.0	290 9051 00	11877.500	20.6-20.8	290 9095 00	15927.500	28.7-28.9	290 9145 00
7577.500	12.0-12.2	290 9052 00	11977.500	20.8-21.0	290 9096 00	15977.500	28.8-29.0	290 9136 00
7677.500	12.2-12.4	290 9053 00	12077.500	21.0-21.2	290 9097 00	16027.500	28.9-29.1	290 9146 00
7777.500	12.4-12.6	290 9054 00	12177.500	21.2-21.4	290 9098 00	16077.500	29.0-29.2	290 9137 00
7877.500	12.6-12.8	290 9055 00	12277.500	21.4-21.6	290 9099 00	16127.500	29.1-29.3	290 9147 00
7977.500	12.8-13.0	290 9056 00	12377.500	21.6-21.8	290 9100 00	16177.500	29.2-29.4	290 9138 00
8077.500	13.0-13.2	290 9057 00	12477.500	21.8-22.0	290 9101 00	16227.500	29.3-29.5	290 9148 00
8177.500	13.2-13.4	290 9058 00	12577.500	22.0-22.2	290 9102 00	16277.500	29.4-29.6	290 9139 00
8277.500	13.4-13.6	290 9059 00	12677.500	22.2-22.4	290 9103 00	16327.500	29.5-29.7	290 9149 00
8377.500	13.6-13.8	290 9060 00	12777.500	22.4-22.6	290 9104 00	16377.500	29.6-29.8	290 9140 00
						16477.500	29.8-30.0	290 9141 00

KWM-2 Transceiver

ITEM	DESCRIPTION	COLLINS PART NO.
V15	ELECTRON TUBE: triode-diode; Sylvania type 6BJ8	255 0334 00
V16	ELECTRON TUBE: triode-pentode; Sylvania type 6EB8	255 0336 00
XDS1	LAMP HOLDER: miniature; bayonet; clip mounting	262 1210 00
XV1 thru XV4 XV12 thru XV17	SOCKET, ELECTRON TUBE: noval type; molded construction; low loss composition	220 1054 00
XV5, XV6, XV8, XV11	SOCKET, ELECTRON TUBE: 9 pin miniature; brass & copper w/plastic insulation	220 1103 00
XV7	SOCKET, ELECTRON TUBE: 7 pin miniature; tube socket; molded construction, plastic	220 1111 00
XV9, XV10	SOCKET, ELECTRON TUBE: 8 female contacts	220 1155 00
XY1	SOCKET, CRYSTAL: accommodates 14 crystals; silver pl copper contacts; phenolic body, 21/32 in. by 2-15/32 in. by 2-1/16 in.	544 2825 002
XY2	SOCKET, CRYSTAL: 2 regularly spaced contact positions, 0.486 in. c to c each contact 0.243 in. from center; cadmium plated phosphor bronze or beryllium copper	292 0082 00
Y1	CRYSTAL UNIT QUARTZ: 6.555 kc frequency	290 8728 00
Y2	CRYSTAL UNIT QUARTZ: 6.755 kc frequency	290 8729 00
Y3	CRYSTAL UNIT QUARTZ: 6.955 kc frequency	290 8730 00
Y4	CRYSTAL UNIT QUARTZ: 10.155 kc frequency	290 8731 00
Y5	CRYSTAL UNIT QUARTZ: 10.355 kc frequency	290 8732 00
Y6	CRYSTAL UNIT QUARTZ: 8.5775 kc frequency	290 8733 00
Y7	CRYSTAL UNIT QUARTZ: 8.6775 kc frequency	290 8734 00
Y8	CRYSTAL UNIT QUARTZ: 8.9775 kc frequency	290 8735 00
Y9	CRYSTAL UNIT QUARTZ: 12.0775 kc frequency	290 8736 00
Y10	CRYSTAL UNIT QUARTZ: 12.1775 kc frequency	290 8737 00
Y11	CRYSTAL UNIT QUARTZ: 12.2775 kc frequency	290 8738 00
Y12	CRYSTAL UNIT QUARTZ: 15,777.500 kc 1 sec, ±0.005% tolerance of frequency	290 9134 00
Y13	NOT SUPPLIED	
Y14	NOT SUPPLIED	
Y15	CRYSTAL UNIT QUARTZ: 100.000 kc	290 8454 00
Y16	CRYSTAL UNIT QUARTZ: 453.650 kc	290 8705 00
Y17	CRYSTAL UNIT QUARTZ: 456.350 kc	290 8706 00
Y18	NOT USED	
Y19 thru Y25	NOT SUPPLIED	
Z1, Z2	SUPPRESSOR, PARASITIC: 2 turns #18 AWG copper wire, 470 ohms, 2 w resistor; 0.318 in. dia by 0.688 in. lg	540 5641 00
Z3	OSCILLATOR 70K-2: c/o the 300 series; return equipment to Collins Radio Company for repair	522 1093 00
Z4	SUPPRESSOR, PARASITIC: 4 turns #26 AWG copper wire; 56 ohms, 10 w resistor; 0.250 in. lg, 0.090 in. dia	544 9698 00
Z5	TRAP, RADIO FREQUENCY: 9 to 11.5 mc tuning range; 10.5 mc; incl 15 uuf capacitor	278 0292 00
	70K-2 OSCILLATOR	522 1093 00
	70K-2 Oscillator consists of the following. This equipment should be returned to Collins Radio Company for repair.	
*C301	CAPACITOR, CERAMIC: 20 uuf ±5%, 500 vdcw	913 0053 00
*C301	CAPACITOR, CERAMIC: 20 uuf ±5%, 500 vdcw	913 0054 00
*C301	CAPACITOR, CERAMIC: 20 uuf ±5%, 500 vdcw	913 0055 00
*C301	CAPACITOR, CERAMIC: 20 uuf ±5%, 500 vdcw	913 0056 00
*C301	CAPACITOR, CERAMIC: 20 uuf ±5%, 500 vdcw	913 0057 00
*C301	CAPACITOR, CERAMIC: 20 uuf ±5%, 500 vdcw	913 0058 00
*C301	CAPACITOR, CERAMIC: 20 uuf ±5%, 500 vdcw	913 0232 00
*C301	CAPACITOR, CERAMIC: 20 uuf ±5%, 500 vdcw	913 0233 00
*C301	CAPACITOR, CERAMIC: 20 uuf ±5%, 500 vdcw	913 0234 00
C302	CAPACITOR, MICA: 1000 uuf ±2%, 500 vdcw	912 1737 00
C303	CAPACITOR, MICA: 3000 uuf ±1%, 500 vdcw	912 1748 00
C304	CAPACITOR, MICA: 470 uuf ±2%, 300 vdcw	912 0541 00
**C305	CAPACITOR, CERAMIC: 100 uuf ±2%, 500 vdcw	913 0074 00
**C305	CAPACITOR, CERAMIC: 100 uuf ±2%, 500 vdcw	913 0246 00
C306, C307, C309	CAPACITOR, CERAMIC: 0.02 uf +60% -40%, 250 vdcw	913 2097 00
C308	CAPACITOR, VARIABLE, CERAMIC: 5 uuf min to 37.5 uuf max, 350 vdcw	917 1073 00
CR301	SEMICONDUCTOR DEVICE, DIODE: germanium; Sylvania part no. 1N34A	353 0103 00
L301	COIL, RADIO FREQUENCY: 22 turns #28 AWG double formvar, 2.4 uh inductance	240 0652 00
L302	TRIMMER ASSEMBLY: 9 turns #28 AWG wire, 1 toroid coil and hardware	543 7323 00
L303	INDUCTOR, TUNING: 10 turns #30 AWG wire	543 7333 003
L304	COIL, RADIO FREQUENCY: single layer wound, magnet wire, 3.30 uh	240 0695 00
R301, R303	RESISTOR, COMPOSITION: 0.10 megohms ±10%, 1/2 w	745 1436 00
R302	RESISTOR, COMPOSITION: 82,000 ohms ±5%, 1/2 w	745 1432 00
T301	TRANSFORMER, RADIO FREQUENCY: pri 380 uh nom 790 kc; sec 2.7 uh nom., 2.6 mc	240 0665 00
V301	ELECTRON TUBE: pentode; General Electric type 6AU6	255 0202 00
	516F-2 POWER SUPPLY	522 1170 00
C1	CAPACITOR, FIXED, PAPER: 0.05 uf ±10%, 1000 vdcw	961 4646 00
C2, C3, C4	CAPACITOR, FIXED, ELECTROLYTIC: 30 uf -10% +40%, 400 vdcw	183 1771 00
C5A, C5B	CAPACITOR, FIXED, ELECTROLYTIC: dual section, 15 uf -10% +40%, 400 v; 30 uf -10% +40%, 400 v	183 1781 00
C6	CAPACITOR, FIXED, DRY ELECTROLYTIC: 10 uf -15% +50%, 250 vdcw	183 1046 00
C7	CAPACITOR, FIXED, DRY ELECTROLYTIC: 10 uf -10% +100%, 150 vdcw	183 1040 00
CR1	RECTIFIER, METALLIC: selenium	353 0153 00
F1	FUSE, CARTRIDGE: 4 amps, 125 v, glass enclosed, 4 spares furnished	264 0217 00
L1, L2	REACTOR: 2 coils, 8.0 henrys, 150 ma dc, 200 ohms resistance, ea reactor	668 0300 00
L3	REACTOR: 1 coil, 0.92 henrys, 180 ma dc, 25 ohms resistance	668 0322 00
P1	CONNECTOR, RECEPTACLE, ELECTRICAL: 11 female socket contacts, Amphenol 78-S11T or Cinch 13786; mates w/Amphenol p/n 86CP11T Collins Radio p/n 372 1757 00 Shell for mating connector	372 1759 00
P2	ADAPTER, CONNECTOR: 2 mating ends, 3 contacts ea end, plastic dielectric, a-c plug 110 v, adapts 3 contact male plug to a 2 contact female receptacle	368 0110 00
R1, R2, R3	RESISTOR, FIXED, COMPOSITION: 270K ohms ±10%, 2 w	745 5754 00
R4, R5	RESISTOR, FIXED, WIREWOUND: 25K ohms ±5%, 11 w	710 0080 00
R6	RESISTOR, FIXED, WIREWOUND: 24K ohms ±5%, 25 w	710 0374 00
R7	RESISTOR, FIXED, COMPOSITION: 100 ohms ±10%, 1/2 w	745 1310 00
R8	RESISTOR, FIXED, COMPOSITION: 4700 ohms ±10%, 2 w	745 5680 00
R9	RESISTOR, VARIABLE, WIREWOUND: 2500 ohms ±10%, 2 w	750 0522 00
R10	RESISTOR, FIXED, COMPOSITION: 5600 ohms ±10%, 2 w	745 5684 00
T1	TRANSFORMER, POWER: pri 115 v 50/60 cps, sec. 6.3 5.0 v, 5.0 v, 275 v ct & tapped at 115V, 800 v ct	662 0434 00
V1	ELECTRON TUBE: type 5R4GYA	257 0142 00
V2	ELECTRON TUBE: type 5U4GB	257 0109 00
XF1	FUSEHOLDER: extractor post type, 125 v, 5 amp, accommodates 3AG cartridge fuse	265 1002 00
XV1, XV2	SOCKET, ELECTRON TUBE: 8 contact, octal, phenolic insulation	220 1155 00

*Chosen per operational requirement

**Selected in final test

KWM-2 Transceiver

ITEM	DESCRIPTION	COLLINS PART NO.
R38	RESISTOR, FIXED, COMPOSITION: 270 ohms, ±10%, 1/2 w	745 1328 00
R39, R45	RESISTOR, FIXED, COMPOSITION: 500, 000 ohms, ±30%, 1/4 w	376 7202 00
R40	RESISTOR, FIXED, COMPOSITION: 100, 000 ohms, ±10%, 1 w	745 3436 00
R41, R6	RESISTOR, FIXED, COMPOSITION: 330 ohms, ±10%, 1/2 w	745 1331 00
R42, R48	RESISTOR, FIXED, COMPOSITION: 8. 2 megohms, ±10%, 1/4 w	745 0890 00
R43	RESISTOR, FIXED, COMPOSITION: 10 megohms, ±10%, 1/4 w	745 0893 00
R46, R115	RESISTOR, FIXED, COMPOSITION: 2200 ohms, ±10%, 1/2 w	745 1366 00
R51, R52	RESISTOR, FIXED, COMPOSITION: 0. 39 megohms, ±10%, 1/4 w	745 0842 00
R53	RESISTOR, FIXED, COMPOSITION: 33, 000 ohms, ±10%, 1/4 w	745 0803 00
R54	RESISTOR, FIXED, COMPOSITION: 68, 000 ohms, ±10%, 1/4 w	745 0815 00
R55, R66, R96, R122	RESISTOR, FIXED, COMPOSITION: 0. 22 megohms, ±10%,1/2 w	745 1450 00
R56, R95, *R161	RESISTOR, FIXED, COMPOSITION: 5600 ohms, ±10%, 1/2 w	745 1384 00
R61, R157	RESISTOR, FIXED, COMPOSITION: 150 ohms, ±10%, 1/2 w	745 1317 00
R65, R128	RESISTOR, FIXED, COMPOSITION: 1. 0 megohm, ±10%, 1/2 w	745 1478 00
R67, R79, R120, R141	RESISTOR, FIXED, COMPOSITION: 39, 000 ohms, ±10%, 1/2 w	745 1419 00
R68	RESISTOR, FIXED, COMPOSITION: 15, 000 ohms, ±10%, 1/2 w	745 1401 00
R69, R73	RESISTOR, FIXED, COMPOSITION: 15, 000 ohms, ±10%, 1 w	745 3401 00
R70, R105	RESISTOR, FIXED, COMPOSITION: 22, 000 ohms, ±10%, 2 w	745 5708 00
R72, R153	RESISTOR, FIXED, COMPOSITION: 6800 ohms, ±10%, 2 w	745 5687 00
R75	RESISTOR, FIXED, COMPOSITION: 10 ohms, ±10%, 1/2 w	745 1268 00
R82	RESISTOR, FIXED, COMPOSITION: 4700 ohms, ±10%, 1/4 w	745 0773 00
R84	RESISTOR, VARIABLE, COMPOSITION: 10, 000 ohms, ±30%, 1/4 w	376 7402 00
R85, R99	RESISTOR, FIXED, COMPOSITION: 12, 000 ohms, ±10%, 1/2 w	745 1398 00
R86	RESISTOR, FIXED, WIREWOUND: 2500 ohms, ±10%, 7 w	710 9000 00
R87	RESISTOR, FIXED, COMPOSITION: 6800 ohms, ±10%, 1/2 w	745 1387 00
R88, R126, R129	RESISTOR, FIXED, COMPOSITION: 820 ohms, ±10%, 1/2 w	745 1349 00
R89, R164	RESISTOR, FIXED, COMPOSITION: 0. 22 megohms, ±10%, 1/4 w	745 0833 00
R90	RESISTOR, FIXED, COMPOSITION: 27, 000 ohms, ±10%, 1/2 w	745 1412 00
R92	RESISTOR, VARIABLE, COMPOSITION: 500, 000 ohms, ±30%, 1/4 w	376 7405 00
R94	RESISTOR, FIXED, COMPOSITION: 2. 2 megohms, ±10%, 1/4 w	745 0869 00
R97	RESISTOR, FIXED, COMPOSITION: 68 ohms, ±10%, 1/2 w	745 1303 00
R100	RESISTOR, FIXED, COMPOSITION: 10 ohms, ±10%, 1 w	745 3268 00
R103	RESISTOR, FIXED, COMPOSITION: 10, 000 ohms, ±10%, 1/4 w	745 0785 00
R107	RESISTOR: 47 ohms, ±10%, 2 w (p/o Z1)	
R108	RESISTOR: 47 ohms, ±10%, 2 w (p/o Z2)	
R109 thru R114	RESISTOR, FIXED, COMPOSITION: 12 ohms, ±10%, 1/2 w	745 1272 00
R116, R133	RESISTOR, FIXED, COMPOSITION: 18, 000 ohms, ±10%, 1/2 w	745 1405 00
R118	RESISTOR, FIXED, COMPOSITION: 0. 68 megohms, ±10%, 1/4 w	745 0851 00
R121	RESISTOR, VARIABLE, COMPOSITION: 100, 000 ohms, ±20%, 0. 2 w	376 4622 00
R131	RESISTOR, FIXED, COMPOSITION: 33, 000 ohms, ±10%, 2 w	745 5715 00
R132	RESISTOR, VARIABLE, COMPOSITION: 1000 ohms, ±29%, 0. 2 w	376 4623 00
R134, R160	RESISTOR, FIXED, COMPOSITION: 0. 12 megohms, ±10%, 1/2 w	745 1440 00
R137, R147	RESISTOR, FIXED, COMPOSITION: 82, 000 ohms, ±10%, 1/2 w	745 1433 00
R140	RESISTOR, FIXED, COMPOSITION: 22, 000 ohms, ±10%, 1/4 w	745 0797 00
R142	RESISTOR, FIXED, COMPOSITION: 10, 000 ohms, ±10%, 1 w	745 3394 00
R143	RESISTOR, FIXED, COMPOSITION: 1500 ohms ±10% 1/2 w	745 1359 00
R144	RESISTOR, FIXED, COMPOSITION: 3300 ohms, ±10%, 1/2 w	745 1373 00
R146	RESISTOR, FIXED, WIREWOUND: 15, 000 ohms, ±10%, 7 w	710 9001 00
R148	RESISTOR, FIXED, COMPOSITION: 820 ohms, ±10%, 2 w	745 5649 00
R150, R172	RESISTOR, FIXED, COMPOSITION: 82 ohms, ±10%, 1/4 w	745 0710 00
R151, R124	RESISTOR, FIXED, COMPOSITION: 3900 ohms, ±10%, 1/4 w	745 0770 00
R152, R81	RESISTOR, FIXED, COMPOSITION: 5600 ohms, ±10%, 1/4 w	745 0776 00
R155, R156	RESISTOR, FIXED, COMPOSITION: 1. 5 megohms, ±10%, 1/2 w	745 1485 00
R158	RESISTOR, FIXED, COMPOSITION: 68 ohms, ±10%, 1/4 w	745 0707 00
*R161	RESISTOR, FIXED, COMPOSITION: 2700 ohms, ±10%, 1/2 w	745 1370 00
*R161	RESISTOR, FIXED, COMPOSITION: 3300 ohms, ±10%, 1/2 w	745 1373 00
*R161	RESISTOR, FIXED, COMPOSITION: 3900 ohms, ±10%, 1/2 w	745 1377 00
*R161	RESISTOR, FIXED, COMPOSITION: 4700 ohms, ±10%, 1/2 w	745 1380 00
R163	RESISTOR, FIXED, WIREWOUND: 6000 ohms, ±10%, 5 w	710 9118 00
R166	RESISTOR, FIXED, COMPOSITION: 1800 ohms, ±10%, 1/2 w	745 1363 00
R167	RESISTOR, FIXED, COMPOSITION: 470 ohms, ±10%, 1/2 w	745 1338 00
R173	RESISTOR, FIXED, COMPOSITION: 22 ohms, ±10%, 2 w	745 5582 00
S1	NOT USED	
S2	SWITCH, ROTARY: 1 circuit, 14 positions, 1 moving contact, 15 fixed contacts	269 2023 00
S3, S4, S5	SWITCH, ROTARY: 1 pole; 1 moving contact, 10 fixed contacts	269 2048 00
S6	SWITCH SECTION, ROTARY: 2 circuit, 14 positions, 2 moving contact,17 fixed contacts	269 1983 00
S7	SWITCH SECTION, ROTARY: 1 circuit, 14 positions, 1 section, 20 moving contacts, 20 fixed contacts	269 1981 00
S8	SWITCH SECTION, ROTARY: 1 circuit, 14 positions, 1 section, 2 moving contacts, 12 fixed contacts	269 1982 00
S9	SWITCH, ROTARY: 4 sections, 8 pole, 5 positions; 2 moving contacts, 12 fixed contacts	259 1076 00
S10	NOT USED	
S11	SWITCH, ROTARY: 1 section, 1 pole, 4 positions, 1 moving contact, 4 fixed contacts	259 1075 00
S12	SWITCH, ROTARY: 1 section, 2 pole, 3 positions, 2 moving contacts, 8 fixed contacts	259 1014 00
S13	SWITCH, ROTARY: 1 section, 1 pole, 14 positions, 1 moving contact, 15 fixed contacts	259 1081 00
T1	TRANSFORMER, INTERMEDIATE, FREQUENCY: 440 to 470 kc frequency range circuit application-interstage	278 0276 00
T2	TRANSFORMER INTERMEDIATE FREQUENCY: 3. 055 mc center frequency; 220 kc band pass at 3 db, attenuation 35 db min. from 2. 5 mc to 2. 7 mc	278 0293 00
T3	TRANSFORMER, RADIO FREQUENCY: 3 turns #28 AGW wire, single layer wound, 18 turns #26 AWG wire, single layer wound	544 9715 002
T4	TRANSFORMER, RADIO FREQUENCY: 12 turns #28 AWG wire	544 9712 002
T5	TRANSFORMER, INTERMEDIATE, FREQUENCY: 440 kc to 470 kc frequency range	278 0281 00
T6	TRANSFORMER, AUDIO FREQUENCY: plate coupling type, 8000 ohms primary; 500 ohms secondary w/4 ohm tap; primary 35 ma dc, secondary 0 dc; open frame	667 0368 00
V1, V3, V4	ELECTRON TUBE: triode-pentode; RCA type 6AZ8	255 0333 00
V2, V11, V12, V13	ELECTRON TUBE: triode-pentode; General Electric type 6U8A	255 0328 00
V5, V6	ELECTRON TUBE: glass envelope, twin triode; Tung-Sol Electronics type 12AT7	255 0205 00
V7	ELECTRON TUBE: glass envelope; pentode; Radio Corp. of America type 6DC6	255 0226 00
V8	ELECTRON TUBE: power pentode; RCA type 6CL6	255 0216 00
V9, V10	ELECTRON TUBE: pentode; RCA type 25L6	255 0101 00
V14, V17	ELECTRON TUBE: triode-diode; Sylvania type 6BN8	255 0335 00

*Chosen per operational requirement

ITEM	DESCRIPTION	COLLINS PART NO.
FL1	FILTER, BAND PASS: mechanical, 455.0 kc center frequency; 2.125 kc at 6 db, 5.3 kc at 60 db, terminal impedance 17,000 ohms, resonating capacity 130 uuf	526 9337 00
J1, J18	JACK, TIP: accommodates 1/8 in. plug; ceramic insulation brass contacts	360 0088 00
J2 thru J12, J16 J19 thru J23, J26 J27	JACK, TIP: small banana contact accommodated, (0.125) insulated, plastic	360 0148 00
J13	CONNECTOR, RECEPTACLE, ELECTRICAL: 11 pin male, phenolic insulation, 5 amps, straight shape	372 1757 00
J14	JACK, TELEPHONE: spring leaf contact, J5-2C; 0.253 in. id, 3/4 in. od; thd 1/4 in. barrel 0.276 in. lg; 3/8-32 NEF-2	360 0169 00
J15	JACK, TELEPHONE: spring leaf; 0.728 in. lg by 49/64 in. dia; 2 conductor plug, 23/32 in. lg by 1/4 in. dia shank	358 1050 00
J17, J24	SOCKET, ELECTRON TUBE: 9 pin miniature, top mtg (incl XV1)	220 1054 00
J25, P17	CONNECTOR, PLUG, ELECTRICAL: 9 male contacts; 5 amps; 3800 v ac (incl P17)	372 1841 00
K1	NOT USED	
K2	RELAY, ARMATURE: 2C arrangement, low level RF; 2C arrangement, 300 ma at 275 v dc; 14,000 ohms resistance; continuous duty cycle	970 1940 00
K3	RELAY, ARMATURE: antenna switching type, 2C contact arrangement, 2 amps, 175 w, 2.30 mc; 1 inductive winding, 115 v dc, 10,000 ohms	970 1914 00
K4	RELAY, ARMATURE: 4C arrangement, 150 ma at 250 v dc; 2C arrangement, low level RF; 10,000 ohms resistance; continuous duty cycle	970 1941 00
L1	NOT USED	
L3, L7, L31, L33	COIL, RADIO FREQUENCY: single wound; 3 pi universal wound; unshielded; 2.0 uh, ±10% at 350 kc; each pi 225 turns of no. 40 AWG copper wire	240 0084 00
L2	COIL, RADIO FREQUENCY: universal pi wound; 6 pies; 10 uh nom inductance	240 0199 00
L4	COIL, ASSEMBLY INTERMEDIATE FREQUENCY: 3.055 mc center freq; 220 kc band pass at 3 db, attenuation 35 db min. from 2.5 mc to 2.7 mc	278 0293 00
L5, L6, L11, L22, L25	COIL, RADIO FREQUENCY: 3 universal wound pi sections, 75 turns ea; no. 36 AWG copper wire; powdered iron coil form; 220 uh inductance, 1 amp	240 0037 00
L9	TUNING UNIT, RADIO FREQUENCY: freq range 440 kc to 470 kc	278 0277 00
L10	COIL, RADIO FREQUENCY: single layer wound; 13 turns no. 28 AWG wire, 1.045 in. lg, panelyte coil form, 0.260 in. id, 0.3544 in. od, 1-11/16 in. lg	544 3135 002
L12	COIL, RADIO FREQUENCY: universal wound; 4 pi, 139 turns no. 36 AWG ea section; 2.0 mh inductance	240 0134 00
L13	COIL, RADIO FREQUENCY: single layer wound, 22 turns #28 AWG wire, panelyte coil form 0.260 in. id, 0.3544 in. od, 1-11/16 in. lg	543 8123 002
L14	COIL, RADIO FREQUENCY: single layer wound, 12 turns, #28 AWG wire, panelyte coil form, 0.260 in. id, 0.3094 in. od, by 1-11/16 in. lg	543 8028 002
L15	COIL: 2 turns of #18 wire (p/o Z1)	
L16	COIL: 2 turns of #18 wire (p/o Z2)	
L17	COIL: RADIO FREQUENCY: single layer wound, 220 turns of no. 32 AWG wire 0.5194 in. dia by 3 in. lg overall	543 8024 00
L18	COIL, RADIO FREQUENCY: 6-1/2 turns single layer wound, #14 AWG copper wire; 5/8 in. id	544 9701 00
L19	COIL, RADIO FREQUENCY: 32 turns no. 18 AWG wire, each turn tapped; 3 in. lg by 1 in. od	506 7848 002
L20	COIL, RADIO FREQUENCY: single layer wound, 39 uh inductance, 2 ohms dc, 500 ma current	240 0171 00
L21	COIL, RADIO FREQUENCY: multiple section duolateral wound; 4 sections; 2.5 mh, 35 to 50 ohms, 0.125 amps	240 2100 00
L23	COIL, RADIO FREQUENCY: single layer wound, 22 uh, 0.30 ohms, 1800 ma	240 0186 00
L24, L28, L32	NOT USED	
L26, L35	COIL, RADIO FREQUENCY: single layer wound; magnet wire w/enamel or formvar insulation; 10.0 uh, 0.60 ohms, 740 ma current rating	240 0149 00
L27	COIL, RADIO FREQUENCY: single layer wound; tinned no. 21 or 22 AWG; 2.70 uh, 1.20 ohms resistance, 500 ma	240 0069 00
L29	COIL, RADIO FREQUENCY: 20 turns #26 AWG copper wire, single layer wound; powdered iron core; 0.200 in. dia by 1/2 in. lg wire lead terminals	544 9700 00
L30, L34	COIL, RADIO FREQUENCY: 20 turns #18 AWG copper magnet wire, single layer wound; powdered iron core; 0.250 in. dia by 1 in. lg; wire lead terminals	544 9699 00
M1	VOLTMETER: panel type, dc type, measures 0-400 ma or 0-60 db plastic case	458 0491 00
O1 thru O6	KNOB, ASSEMBLY: pointer, push on type, black phenolic, approx. 1-1/8 in. dia. 3/4 in. h, incl spring	543 8039 00
O7	KNOB, ASSEMBLY: fluted, 8 flutes push on type, pin mtg, black phenolic, 2.078 in. dia by 0.859 in. h; incl disc; spring and skirt	543 8041 00
O8	KNOB, ASSEMBLY: fluted, 5 flutes push on type, pin mtg, black phenolic, spring, pointer and disc. incl	543 8044 00
O9	KNOB, ASSEMBLY: fluted, 5 flutes push on type, pin mtg, black phenolic, spring, pointer and disc incl	543 8044 00
P1 thru P12, P16, P19 thru P21	PLUG, TIP: phone type; 1 terminal; 1-1/4 in. lg	361 0062 00
P13	CONNECTOR, RECEPTACLE, ELECTRICAL: 11 female socket contacts	372 1759 00
P14, P18, P22 thru P25	NOT LISTED	
P15	PLUG, TELEPHONE JACK: 3 circuit, 3/16 in. nom. barrel dia. black plastic, straight, 3.218 in. lg by 0.500 in. dia.	361 0001 00
P25	CONNECTOR, RECEPTACLE, ELECTRICAL: 9 female contacts, 5 amps; 3800 v ac	372 1842 00
R1, R91, R138, R139	RESISTOR, FIXED, COMPOSITION: 47,000 ohms, ±10%, 1/4 w	745 0809 00
R2, R13, R63, R74, R78, R93, R171	RESISTOR, FIXED, COMPOSITION: 1 megohm, ±10%, 1/4 w	745 0857 00
R3	RESISTOR, FIXED, COMPOSITION: 180 ohms, ±10%, 1/2 w	745 1321 00
R4, R37	RESISTOR, FIXED, COMPOSITION: 68,000 ohms, ±10%, 1/2 w	745 1429 00
R5, R26, R98, R136, R165	RESISTOR, FIXED, COMPOSITION: 0.47 megohm, %10%, 1/4 w	745 0845 00
R7, R50, R76, R80, R123, R125, R145	RESISTOR, FIXED, COMPOSITION: 47,000 ohms, ±10%, 1/2 w	745 1422 00
R8, S14	RESISTOR, VARIABLE, COMPOSITION: 500,000 ohms ±30%, 1/4 w	376 7404 00
R9, R28, R168	RESISTOR, FIXED, COMPOSITION: 56 ohms, ±10%, 1/4 w	745 0704 00
R10, R12, R57, R58, R64, R77, R102, R117, R135, R149, R159, R169	RESISTOR, FIXED, COMPOSITION: 1000 ohms, ±10%, 1/2 w	745 1352 00
R11, R44	RESISTOR, FIXED, COMPOSITION: 0.27 megohms, ±10%, 1/2 w	745 1454 00
R14, R16	RESISTOR, FIXED, COMPOSITION: 270 ohms, ±10%, 1/4 w	745 0728 00
R15, R24, R36	RESISTOR, VARIABLE, COMPOSITION: 250 ohms, ±20%, 0.2 w	376 4621 00
R17, R27, R31, R59, R60, R62	RESISTOR, FIXED, COMPOSITION: 100,000 ohms, ±10%, 1/4 w	745 0821 00
R18	RESISTOR, FIXED, COMPOSITION: 47,000 ohms, ±10%, 1 w	745 3422 00
R19, R21, R101, R162	RESISTOR, FIXED, COMPOSITION: 47 ohms, ±10%, 1/2 w	745 1296 00
R20, R47	RESISTOR, FIXED, COMPOSITION: 68,000 ohms, ±10%, 2 w	745 5729 00
R22, R174	RESISTOR, FIXED, COMPOSITION: 56 ohms, ±10%, 1/2 w	745 1300 00
R23, R25	RESISTOR, FIXED, COMPOSITION: 120 ohms, ±10%, 1/2 w,	745 1314 00
R29, R30, R170	RESISTOR, FIXED, COMPOSITION: 220 ohms, ±10%, 1/2 w	745 1324 00
R32, R104, R106	RESISTOR, FIXED, COMPOSITION: 100 ohms ±10%, 1/2 w	745 1310 00
R33	RESISTOR, FIXED, COMPOSITION: 33,000 ohms, ±10%, 1 w	745 3415 00
R34, R83, R119	RESISTOR, FIXED, COMPOSITION: 3.3 megohms, ±10%, 1/4 w	745 0875 00
R35, R49, R71, R127, R130, R154	RESISTOR, FIXED, COMPOSITION: 0.10 megohms, ±10%, 1/2 w	745 1436 00

KWM-2 Transceiver

ITEM	DESCRIPTION	COLLINS PART NO.
C7, C8, C20, C43, C47, C71, C75, C80, C89, C92, C107, C108, C122, C126, C139, C146, C156, C158, C169, C188, C193, C196, C200, C202, C211, C212, C222, C229, C235, C252	CAPACITOR, FIXED, CERAMIC: 10,000 uuf, +100% -20%, 500 v dc	913 3013 00
C9, C21, C36, C116, C134, C136	CAPACITOR, VARIABLE, CERAMIC: 5 uuf min., 37.5 uuf max.; 350 v dc	917 1073 00
C10	CAPACITOR, FIXED, MICA: 33 uuf, ±10%, 500 v dc	912 2781 00
C11, C15, C23, C27, C40, C41, C44, C45, C58, C59, C61, C62, C72, C83, C91, C124, C186, C187, C219, C220, C226, C232, C234	CAPACITOR, FIXED, CERAMIC: 1000 uuf, +100% -20%, 500 v dc	913 3009 00
C12/13, C18/19, C28/29, C78/237, C85/86, C147, C161/162, C163/164, C165/166, C167/190, C181/182, C191/192, C194/201, C195/197, C198/199, C203/204, C205/206, C207/208, C209/210, C242/243, C244/245, C246/247, C250/251	CAPACITOR, FIXED, CERAMIC: dual type, 0.01 uf, GMV, 500 v dc per section	913 3829 00
C14	CAPACITOR, FIXED, MICA: 100 uuf, ±5%, 500 v dc	912 2816 00
C16	CAPACITOR, FIXED, MICA: 51 uuf, ±5%, 500 v dc	912 2795 00
C22, C35	CAPACITOR, FIXED, MICA: 22 uuf, ±5%, 500 v dc	912 2768 00
C25, C79	CAPACITOR, FIXED, CERAMIC: 3 uuf, ±1/2, 500 v dc	916 0145 00
C26	CAPACITOR, TUBULAR, CERAMIC: 6 uuf, ±1/2 uuf, 500 v dc	916 0122 00
C30, C31, C94	CAPACITOR, FIXED, MICA: 10 uuf, ±10%, 500 v dc	912 2754 00
C32, C34, C37, C63, C65, C67, C68, C70, C76, C109, C113, C115, C120, C129, C130, C132, C184	CAPACITOR, VARIABLE, CERAMIC: 8 to 75 uuf, 350 v dc	917 1075 00
C33, C64, C133	CAPACITOR, FIXED, MICA: 130 uuf, ±5%, 500 v dc	912 2825 00
C38	CAPACITOR, FIXED, MICA: 360 uuf, ±5%, 500 v dc	912 2855 00
C39, C117	CAPACITOR, VARIABLE, CERAMIC: 1.5 to 10.5 uuf, 350 v dc	917 1071 00
C42	NOT USED	
C46, C49, C90, C221, C227, C236, C238	CAPACITOR, FIXED, CERAMIC: 0.1 uf, +80% -20%, 500 v dc	913 3152 00
C50, C51, C52, C105	CAPACITOR, FIXED, MICA: 470 uuf, ±5%, 500 v dc	912 2864 00
C53	CAPACITOR, FIXED, MICA: 22 uuf, ±10%, 500 v dc	912 2769 00
C54	NOT USED	
C55, C66, C74	CAPACITOR, FIXED, MICA: 47 uuf, ±5%, 500 v dc	912 2792 00
C60	CAPACITOR, FIXED, MICA: 20 uuf, ±10%, 500 v dc	912 2766 00
C69	CAPACITOR, FIXED, MICA: 160 uuf, ±2%, 500 v dc	912 2830 00
C73, C81	NOT USED	
C77, C87, C240	CAPACITOR, FIXED, MICA: 100 uuf, ±10%, 500 v dc	912 2817 00
C84, C101, C157, C159, C170, C225, C231, C233, C253	CAPACITOR, FIXED, CERAMIC: 0.1 uf, -30% +80%, 75 v dc	913 3794 00
C88	CAPACITOR, FIXED, MICA: 510 uuf, ±5%, 300 v dc	912 2867 00
C93	CAPACITOR, FIXED, CERAMIC: 0.05 uf, GMV, 100 v dc	913 3679 00
C95	NOT USED	
C97	CAPACITOR, FIXED, MICA: 27 uuf, ±10%, 500 v dc	912 2775 00
C98, C99, C214, C215, C223	CAPACITOR, FIXED, CERAMIC: 470 uuf, +100% -20%, 500 v dc	913 3007 00
C102	CAPACITOR, FIXED, ELECTROLYTIC: 100 uf, -10% +75%, 6 v dc	183 1782 00
C106	CAPACITOR, FIXED, ELECTROLYTIC: 30 uf, 20 uf, 15 uf; each -10% +40%, 350 v dc	183 1702 00
C110	CAPACITOR, FIXED, MICA: 360 uuf, ±5%, 500 v dc	912 2855 00
C111	CAPACITOR, VARIABLE, CERAMIC: 3 uuf min., 18 uuf max, 350 v dc	917 1072 00
C112	CAPACITOR, FIXED, MICA: 240 uuf, ±2%, 500 v dc	912 2842 00
C114, C128, C135	CAPACITOR, FIXED, MICA: 51 uuf, ±10%, 500 v dc	912 2796 00
C118, C138	CAPACITOR, FIXED, CERAMIC: 1.0 uuf, ±1/4 uuf, 500 v dc	916 0070 00
C119	CAPACITOR, FIXED, CERAMIC: 2 uuf, ±1/2, 500 v dc	916 0076 00
C121, C131, C217, C218	CAPACITOR, FIXED, MICA: 220 uuf, ±5%, 500 v dc	912 2840 00
C125	CAPACITOR, FIXED, MICA: 330 uuf, ±2%, 500 v dc	912 2851 00
C140 thru C145, C248, C249	CAPACITOR, FIXED, CERAMIC: 500 uuf, ±10%, 500 v dc	913 0998 00
C148, C149, C168	CAPACITOR, FIXED, CERAMIC: 0.001 uf, +100% -20%, 2000 v dc	913 3537 00
C150	CAPACITOR, VARIABLE, AIR: plate meshing type, 12.0 uuf min. to 250.0 uuf max, 1000 v rms	920 0136 00
C151	CAPACITOR, VARIABLE, AIR: dual section, 13.5 uuf min. to 452.3 uuf max ea section, 360 v ac, 60 cps min. breakdown	920 0138 00
C152, C153, C154	CAPACITOR, VARIABLE, MICA: 100 uuf to 500 uuf, 1000 v dc	918 0006 00
C155	CAPACITOR, VARIABLE, MICA: 15 uuf to 120 uuf, 1000 v dc	918 0005 00
C171	CAPACITOR, MICA: 510 uuf (p/o T1)	
C172	CAPACITOR, MICA: 240 uuf (p/o T2)	
C173	CAPACITOR, MICA: 240 uuf (p/o T2)	
C174	CAPACITOR, MICA: 130 uuf (p/o T2)	
C175	CAPACITOR, MICA: 180 uuf (p/o L4)	
C176	CAPACITOR, MICA: 510 uuf (p/o L4)	
C177	CAPACITOR, MICA: 180 uuf (p/o L9)	
C178	CAPACITOR, MICA: 510 uuf (p/o T5)	
C179	CAPACITOR, MICA: 510 uuf (p/o T5)	
C180, C183	CAPACITOR, FIXED, CERAMIC: 10 uuf, ±10%, 500 v dc	913 0972 00
C185, C189, C213, C239	NOT USED	
C254	CAPACITOR, FIXED, ELECTROLYTIC: 4 uf, -10% +100%, 350 v dc	183 1783 00
C255	NOT USED	
C257, C258	CAPACITOR, FIXED, MICA: 12 uuf, ±10%, 500 v dc	912 2757 00
C259	CAPACITOR, FIXED, ELECTROLYTIC: 8 uf, -15% +100%, 6 v dc	183 1167 00
CR1, CR2 CR3, CR4	SEMICONDUCTOR DEVICE, DIODE: germanium; Sylvania part no. 1N34A	353 0103 00
DS1	LAMP, INCANDESCENT: 6.3 v, 0.945 w, 0.15 amps; 1-1/8 in. lg max. overall	262 3240 00
DS2	BULB: p/o meter assembly M1	
E1 thru E5	CORE, ADJUSTABLE TUNING: ceramic; 0.5 to 32 mc; 1-1/4 in. lg core body, threaded stud type; 1/2 in. lg	288 2509 00
E6, E7	SHELL, ELECTRICAL CONNECTOR: below surface mtg; steel, cadmium pl, 2-1/16 in. by 1.172 in. by 0.781 in. overall	372 1761 00
E8	CLIP, CRYSTAL: beryllium copper; 0.009 in. thk; 3/8 in. w by 0.393 in. lg by 15/64 in. h; 0.120 in. dia mtg hole	504 8229 001
E9, E10, E13	SHIELD, ELECTRON TUBE: 9 pin medium; cylindrical with flared end; open top; brass; 0.95 in. by 1.065 in.; incl beryllium copper insert	541 6554 003
E11	SHIELD, ELECTRON TUBE: 7 pin medium; brass; incl copper insert and hold-down spring	541 6551 003
E12	SHIELD, ELECTRON TUBE: 9 pin large, brass; incl copper insert and hold-down spring	541 6555 003

TABLE 5-2. AVAILABLE ACCESSORIES (Cont)

ITEM	FUNCTION	COLLINS PART NUMBER
312B-5 Station Control	Combinations of features and functions of 312B-4 and 399C-1 accessories.	522 1668 00
351E-4 Mounting Plate	Mount on table or bench.	522 1482 003
351D-2 Mobile Mount	Mount for mobile operation.	522 1726 00
516F-1 A-C Power Supply*	A-c power supply.	522 0847 00
516F-2 A-C Power Supply	A-c power supply.	522 1170 00
516E-1 D-C Power Supply	Mobile power supply for 12-14-volt source.	522 0846 005
516E-2 D-C Power Supply	Mobile power supply for 24-28-volt source.	522 0846 00
PJ-068	Microphone plug.	361 0001 00
302C-3 Directional Wattmeter	Measure forward and reflected power.	522 1696 00
*Use with special cable adapter, Collins part number 543 8791 00.		

SECTION VI
PARTS LIST

KWM-2 Transceiver

ITEM	DESCRIPTION	COLLINS PART NO.
	KWM-2 TRANSCEIVER	522 1611 00
C1, C17, C48, C56, C216, C224, C260	CAPACITOR, FIXED, CERAMIC: 0.02 uf, +100% -20%, 500 v dc	913 2142 00
C2	CAPACITOR, FIXED, MICA: 220 uuf, ±10%, 500 v dc	912 2841 00
C3, C4, C24, C96, C100, C103, C104, C127, C256	CAPACITOR, FIXED, CERAMIC: 4700 uuf, +100% -20%, 500 v dc	913 3012 00
C5, C82, C123, C137, C228, C230, C241	CAPACITOR, FIXED, CERAMIC: 1000 uuf, +80% -20%, 500 v dc	913 1292 00
C6, C160	CAPACITOR, FIXED, CERAMIC: 0.47 uf, +80% -20%, 25 v dc	913 3804 00
C7, C8, C20, C43, C47, C71, C75, C80, C89, C92, C107, C108, C122, C126, C139, C146, C148, C156, C169, C188, C193, C196, C200, C202, C211, C212, C222, C229, C235, C252	CAPACITOR, FIXED, CERAMIC: 10,000 uuf, +100% -20%, 500 v dc	913 3013 00
C9, C21, C35, C116, C134, C136	CAPACITOR, VARIABLE, CERAMIC: 5 uuf min., 37.5 uuf max.; 350 v dc	917 1073 00
C10	CAPACITOR, FIXED, MICA: 33 uuf, ±10%, 500 v dc	912 2781 00
C11, C15, C23, C27, C40, C41, C44, C45, C58, C59, C61, C62, C72, C83, C91, C124, C186, C187, C219, C220, C226, C232, C234	CAPACITOR, FIXED, CERAMIC: 1000 uuf, +100% -20%, 500 v dc	913 3009 00
C1, C17, C48, C56, C216, C224, C260	CAPACITOR, FIXED, CERAMIC: 0.02 uf, +100% -20%, 500 v dc	913 2142 00
C2	CAPACITOR, FIXED, MICA: 220 uuf, ±10%, 500 v dc	912 2841 00
C3, C4, C24, C96, C100, C103, C104, C127, C256	CAPACITOR, FIXED, CERAMIC: 4700 uuf, +100% -20%, 500 v dc	913 3012 00
C5, C82, C123, C137, C228, C230, C241	CAPACITOR, FIXED, CERAMIC: 1000 uuf, +80% -20%, 500 v dc	913 1292 00
C6, C160	CAPACITOR, FIXED, CERAMIC: 0.47 uf, +80% -20%, 25 v dc	913 3804 00

5.5 TUBE AND SEMICONDUCTOR COMPLEMENT.

TABLE 5-1. TUBES AND SEMICONDUCTORS

SYMBOL	FUNCTION	TYPE
V1A	First microphone amplifier	1/2 6AZ8
V1B	First receiver i-f amplifier	1/2 6AZ8
V2A	Vfo cathode follower	1/2 6U8A
V2B	Tone oscillator	1/2 6U8A
V3A	Microphone amplifier cathode follower	1/2 6AZ8
V3B	Receiver second i-f amplifier	1/2 6AZ8
V4A	Transmitter i-f amplifier	1/2 6AZ8
V4B	Vox relay amplifier	1/2 6AZ8
V5	First transmitter mixer	12AT7
V6	Second transmitter mixer	12AT7
V7	Receiver-transmitter r-f amplifier	6DC6
V8	Transmitter driver	6CL6
V9	Transmitter power amplifier	6146
V10	Transmitter power amplifier	6146
V11A	Beat-frequency oscillator	1/2 6U8A
V11B	Second microphone amplifier	1/2 6U8A
V12A	Crystal calibrator	1/2 6U8A
V12B	Crystal oscillator cathode follower	1/2 6U8A
V13A	High-frequency crystal oscillator	1/2 6U8A
V13B	Receiver first mixer	1/2 6U8A
V14A	Vox rectifier (one diode), anti vox rectifier (other diode)	2/3 6BN8
V14B	Vox amplifier	1/3 6BN8
V15A	Avc rectifier (both diodes)	2/3 6BJ8
V15B	Product detector	1/3 6BJ8
V16A	Receiver first a-f amplifier	1/2 6EB8
V16B	Receiver a-f output amplifier	1/2 6EB8
V17A	Alc rectifier (both diodes)	2/3 6BN8
V17B	Receiver second mixer	1/3 6BN8
V301	Variable-frequency oscillator	6AU6

5.6 AVAILABLE ACCESSORIES.

TABLE 5-2. AVAILABLE ACCESSORIES

ITEM	FUNCTION	COLLINS PART NUMBER
136B-2 Noise Blanker	Eliminates noise pulses when the noise components present on the antenna have energy distribution in the 40-mc portion of the spectrum and when the noise pulses have a repetition rate not in excess of 100,000 pulses per second.	522 1661 00
312B-3 Speaker Box	Station speaker.	522 1166 00
312B-4 Station Control	Speaker, phone patch, directional wattmeter, and station control switches.	522 1167 00
399C-1 External VFO	Speaker, extra 70K-2 vfo, and vfo control switches for operating transmitter and/or receiver in different portions of 200-kc band.	522 1597 00

	15 meters - 21.0 to 21.2 mc, 21.2 to 21.4 mc, and 21.4 to 21.6 mc.
	10 meters - 28.5 to 28.7 mc.
Mode	Single sideband (either sideband selectable) or CW.
Type of service	SSB-continuous; CW-50% duty cycle.
Power consumption from a-c line	235 watts in receive function 475 watts in transmit function.
Plate power input	175 watts PEP on SSB, 160 watts on CW.
Power output	100 watts PEP (nominal) into 50 ohms.
Microphone input impedance	High impedance.
R-f output impedance	50 ohms with not more than 2.0-to-1 swr.
R-f input impedance	50 ohms.
Matching speaker impedance	4 ohms.
Matching phone-patch impedance	500 to 600 ohms, receive output to phone patch; high impedance phone-patch input to transmitter.
Frequency stability	Total variation after warmup not more than 100 cps.
Calibration accuracy	1 kilocycle.
Keying	Break-in.
Audio-frequency response	300-2400 cps ±6 db.
Carrier suppression	Carrier 40 db down from output signal.
Unwanted sideband	50 db down from output signal.
Oscillator feedthrough or mixer products (undesired)	50 db down from output signal.
Second harmonic radiation	50 db down from output signal.
Third order distortion	30 db down from output signal.
Receiver sensitivity	0.5 microvolt for 10-db signal to noise ratio for SSB operation in amateur bands.
Receiver selectivity	2.1 kc bandwidth at 6 db down, 4.2 kc bandwidth at 60 db down.
Receiver spurious responses	Image rejection better than 50 db. Internal spurious signals below one microvolt equivalent antenna input.
Receiver output level	1.0 watt maximum.
Size	7-3/4 inches high, 15-1/8 inches wide, 13-3/4 inches deep, overall
Weight	18 pounds, 3 ounces.

c. Connect signal generator to pin 8 of V17B, and increase signal generator output until S-meter shows slight indication (S3). Rock the signal generator frequency to center the signal at the approximate center of the filter pass band.

NOTE

> If a vtvm is available, it may be connected to the avc bus and used as alignment peak indicator.

d. Adjust the slugs of L9 and T5 for peak indication on the S-meter. Reduce signal generator output as necessary to keep S-meter indication low. Repeak L9 and T5 as in any standard alignment procedure.

e. Replace vfo tube.

4.5.2.2 R-F GAIN AND S-METER ZERO ADJUSTMENTS.

a. Set receiver to middle of favorite operating band, and peak EXCITER TUNING control for maximum output. Set R.F. GAIN control (front panel) to maximum clockwise position. Tune calibrated signal generator to same frequency as receiver, and set A.F. GAIN control to maximum counterclockwise position.

b. Short RCVR ANT. jack J2 to ground, and adjust S-METER ZERO potentiometer R121 so S-meter reads zero.

c. Remove short from J2, and apply 100 microvolts from calibrated signal generator. Adjust RF GAIN ADJUST (R132) until S-meter reads S-9.

d. Repeat steps b and c until S-meter reads zero with J2 shorted to ground and S-9 with 100 microvolts input at J2.

4.5.2.3 CRYSTAL CALIBRATOR ADJUSTMENT.

a. Tune WWV to zero beat at 15.0 mc at a time when Station WWV is not transmitting a tone.

b. Turn the function switch to CAL position. Adjust CAL ADJUST trimmer C76 for zero beat of calibration signal.

SECTION V
SPECIFICATIONS

5.1 KWM-2 TRANSCEIVER.

The KWM-2 Transceiver receives and transmits single-sideband or CW signals in all amateur bands between 3.4 and 30.0 mc.

5.2 FREQUENCY COVERAGE.

The transceiver coverage is in 14 bands, each 200 kilocycles wide. With crystals furnished, they cover the entire amateur bands of 80 meters, 40 meters, 20 meters, 15 meters, a 14.8- to 15.0-mc band including WWV, and the 28.5- to 28.7-mc portion of the 10-meter band. The two remaining crystal sockets may be used for crystals selected to provide two additional 200-kc bands within the 10-meter band. Other crystals may be substituted for those furnished to place the transceiver at other frequencies through the range.

5.3 REQUIREMENTS FOR OPERATION.

The transceiver requires a 110-volt, 50- to 60-cycle-per-second, a-c power source and a power supply, such as the 516F-2, for fixed-station operation. It consumes approximately 235 watts of power from the line in receive function and approximately 475 watts in transmit function. The transceiver may be operated mobile by using a power supply, such as the 516E-1 for 12-volt d-c operation or a 516E-2 for 24- to 28-volt operation. In mobile operation the transceiver requires 800 volts d-c at 250 ma; 275 volts d-c at approximately 175 ma; a bias supply adjustable between -60 and -80 volts; and 6, 12, or 24 volts d-c filament supply at 11.0, 5.5, or 2.75 amperes respectively. Any high-impedance crystal or dynamic microphone may be used. A 4-ohm speaker is required. The antenna and feed system must present a 50-ohm load with swr not exceeding 2.0 to 1.

5.4 SPECIFICATIONS.

Frequency range	3.4 to 30.0 megacycles. With crystals furnished, bands are as follows: 80 meters - 3.4 to 3.6 mc, 3.6 to 3.9 mc, and 3.8 to 4.0 mc. 40 meters - 7.0 to 7.2 mc, and 7.2 to 7.4 mc. 20 meters - 14.0 to 14.2 mc, and 14.8 to 15.0 mc (WWV).

c. Connect the r-f probe of the vtvm across the dummy load at J1.

d. Set the BAND switch to 14.0, EMISSION switch to LOCK, and meter switch to PLATE.

e. Adjust the bias control in the power supply for 40-ma no-signal PA plate current. It will be necessary to have the EMISSION switch in LSB or USB position and MIC GAIN full counterclockwise for this adjustment. Reset EMISSION switch to LOCK position.

f. Increase MIC GAIN setting, and adjust EXCITER TUNING and P.A. TUNING controls for maximum voltage across the 50-ohm load. This level will be less than 0.3 volt.

g. Adjust the driver neutralizing capacitor, C117, for a voltage dip. This capacitor is located on the shield partition closest to the shield can. Refer to figure 6-3.

4.5.1.8 FEEDBACK NEUTRALIZING.

a. Set BAND switch to 28A position, EMISSION switch to TUNE, and meter switch to PLATE position.

b. Adjust EXCITER TUNING control for a peak in PA plate current.

c. Dip the PA plate current with the P.A. TUNING control.

d. Repeat steps b and c above.

e. Adjust the feedback neutralizing capacitor, C120, (on driver-PA shield below chassis and farthest from shield cans) until PA plate current dip and power output peak coincide. Readjust the MIC GAIN as necessary to hold PA plate current below saturation during this adjustment.

f. Set BAND switch to 21.2, peak EXCITER TUNING control, and dip PA plate current with P.A. TUNING control.

g. Check that PA plate current dip and power output peak occur at same setting of P.A. TUNING control.

h. Repeat this check on bands 14.2, 7.0, and 3.6. Reconnect power to driver screen grid.

4.5.1.9 VFO SIDEBAND FREQUENCY-SHIFT ADJUSTMENT.

CAUTION

> Do not make this adjustment unless switching from one sideband to the other makes readjustment of tuning dial necessary to keep output signal from shifting. It will always be necessary, after this adjustment, to make carrier balance (null) adjustment given in paragraph 4.5.1.10.

a. Set EMISSION switch to LSB, meter switch to PLATE, BAND switch to 14.0, and tuning dial to 100. Turn VOX GAIN (under top cover) full counterclockwise. Short PTT jack J16 to ground.

b. Rotate CARRIER BAL potentiometer R15 to one end to allow carrier feedthrough from the balanced modulator.

c. Adjust EXCITER TUNING control for maximum plate current, and dip the plate current with the P.A. TUNING control.

d. Tune an auxiliary station receiver to zero beat with the transmitter.

e. Set EMISSION switch to USB, and adjust trimmer C308 (top of vfo can) for zero beat. Remove short from J16 to ground.

4.5.1.10 CARRIER BALANCE ADJUSTMENT.

a. Set BAND switch to 14.0. Connect dummy load to transmitter output J1. Tune and load transmitter.

b. Set EMISSION switch to LSB position, turn MIC GAIN control full counterclockwise.

c. Connect an r-f vtvm across dummy load and set to lowest scale, or use lowest scale on an r-f wattmeter connected in series with load.

d. Key to transmit by shorting PTT jack J16 to ground. If vtvm indication is 0.2 volt or more, adjust CARRIER BAL potentiometer R15 and trimmer C9 until the vtvm indication is less than 0.2 volt. These adjustments interact, so adjust first one and then the other until neither produces any further decrease in vtvm indication.

4.5.1.11 FIRST MIXER BALANCE ADJUSTMENT.

a. Tune and load the transmitter into dummy load at 14.1 mc. Loosely couple a general coverage communications receiver to the transmitter output. Tune the communications receiver back and forth across 14.555 mc until the signal is heard.

b. Adjust the mixer balance potentiometer, R24, and the trimmer, C21, for minimum output. These adjustments interact, so adjust first one and then the other until neither produces further decrease in output.

4.5.1.12 ALC ZERO ADJUSTMENT.

a. Turn MIC GAIN full counterclockwise until switch clicks.

b. Set meter switch to ALC position.

c. Short PTT jack to ground.

d. Adjust ALC ZERO potentiometer R36 (top of chassis near R45) until meter indicates zero.

4.5.2 RECEIVER CIRCUITS ALIGNMENT.

If the transmitter circuits are aligned first, the r-f amplifier tuned circuits, the high-frequency crystal oscillator tuned circuits, the vfo sideband frequency-shift adjustment, and the band-pass i-f transformer alignment will already be completed for the receiver alignment. The only alignments remaining for the receiver circuits are the i-f alignment, the r-f gain adjustment, the S-meter zero adjustment, and crystal calibrator trimmer adjustment.

4.5.2.1 455-KILOCYCLE I-F ALIGNMENT.

a. Remove vfo tube V301 from socket.

b. Set EMISSION switch to USB.

c. Leave PA disabled as in paragraph 4.5.1.2. Turn on KWM-2. Set EMISSION switch to TUNE.

d. Keep vtvm indication at about 0.5 volt by adjusting signal generator output, and peak the primary of T2 and peak L4 with tuning tool, such as Walsco 2543. The primary slug for T2 is in the bottom of the can.

e. Remove the swamping tool from the secondary of T2, and connect it across the primary of T2 (between pins 1 and 6 of the first mixer, V5). Peak the secondary of T2 (top of shield can). Remove swamping tool.

4.5.1.4 R-F CIRCUITS ALIGNMENT.

a. Set the EXCITER TUNING control to 3.5 on the logging scale (lower edge of 40-meter band). Align the tops of the iron cores with the tops of the coil forms by screwdriver adjustments on slug rack.

b. Set tuning dial to 0.

c. Set the BAND switch to 28A and the EXCITER TUNING control to 9 on the logging scale (midway in 28-mc band).

d. Connect r-f vtvm from pin 5 of V9 to ground.

e. Set EMISSION switch to TUNE.

f. Advance MIC GAIN until vtvm indicates PA grid voltage.

g. Peak the trimmers marked (E) 28 for maximum PA grid voltage indication on the vtvm. Keep the indication below 30 volts by adjusting the MIC GAIN as necessary.

h. Remove the r-f probe connection from pin 5 of V9. Set meter switch to GRID position. Repeak the driver plate circuit trimmer, using the PA grid current as peak indication. It may be necessary to advance the MIC GAIN control setting to obtain a grid current indication.

i. Replace the r-f probe connection at V9-5. Set EXCITER TUNING control to 7.5 on the logging scale (lower edge of 21.0-mc band). Set BAND switch to 21.0 position.

j. Peak the trimmers marked (D)21 for maximum PA grid indication on the vtvm. Keep the indication below 30 volts as in step g.

k. Remove the r-f probe connection, and repeak the driver plate circuit trimmer, using PA grid current as peak indication.

l. Replace the r-f probe connection at V9-5. Set EXCITER TUNING control to 6 on the logging scale (lower edge of 14-mc band). Set BAND switch to 14.0.

m. Peak the trimmers marked (C)14 for maximum PA grid voltage indication. Keep the indication below 30 volts as in step g.

n. Remove the r-f probe connection, and repeak the driver plate circuit trimmer, using PA grid current as peak indication.

o. Replace the r-f probe connection at V9-5. Set EXCITER TUNING control to 4.5 on the logging scale (upper end of 7-mc band). Set BAND switch to 7.2. Turn tuning dial to 200.

p. Peak the trimmers marked (B)7.0 for maximum PA grid voltage indication, keeping grid voltage below 30 volts.

q. Remove the r-f probe connection and repeak the driver plate circuit trimmer, using PA grid current as peak indication.

r. Replace the r-f probe connection at V9-5. Set EXCITER TUNING control to 2.8 on the logging scale (upper end of 3.8-mc band). Set BAND switch to 3.8.

s. Peak the trimmers marked (A)3.8 for maximum PA grid voltage indication, keeping the grid voltage below 30 volts.

t. Remove probe and repeak the driver plate circuit trimmer, using PA grid current as peak indication.

4.5.1.5 CRYSTAL OSCILLATOR ALIGNMENT.

a. This procedure is a refinement which peaks the oscillator plate circuits in the center of the 200-kc tuning range. Turn the tuning dial to 100.

b. Set BAND switch to 28A. Adjust EXCITER TUNING control for a peak on the PA grid current meter. Set EMISSION switch to TUNE. Increase MIC GAIN setting, if necessary, to obtain grid current indication.

c. Repeak the (E)28 trimmer in the crystal oscillator plate circuit.

d. Set the BAND switch to 21.2, and adjust EXCITER TUNING control for peak in grid current.

e. Repeak the (D)21 trimmer in the oscillator plate circuit.

f. Repeat this procedure with BAND-switch settings of 14.0, 7.0, and 3.6, adjusting the crystal oscillator plate circuit trimmers (C)14, (B)7.0, and (A)3.8 respectively.

4.5.1.6 PA NEUTRALIZING.

a. Disable PA plate and screen circuits as in paragraph 4.5.1.2, steps a and b.

b. Connect a 50-ohm, noninductive, 100-watt dummy load to OUTPUT jack J1.

c. Remove the cover on the power amplifier shielded compartment, and connect the r-f probe of the vtvm at the top of PA plate choke L17.

d. Set BAND switch to 14.0, EMISSION switch to LOCK, and meter switch to GRID.

e. Advance MIC GAIN setting as necessary, and adjust EXCITER TUNING for peak PA grid current.

f. Adjust P.A. TUNING control for maximum r-f voltage indication on vtvm. Adjust MIC GAIN as necessary to keep this indication below 0.5 volt.

g. From bottom chassis, adjust the PA neutralizing capacitor, C184, for a dip in the vtvm indication. This voltage is PA plate feedthrough.

h. Remove the r-f probe connection from the top of L17, and replace the PA compartment cover.

4.5.1.7 DRIVER NEUTRALIZING.

a. Connect the high-voltage plate supply to the PA tubes by replacing the rectifier tube. Connect the jumper between J5 and J6 (PA DISABLE) jacks to energize PA screen grids.

b. Remove the screen voltage to the driver tube, V8, by unsoldering the screen B+ lead connected to C182 feedthrough capacitor.

TABLE 4-3. VOLTAGE AND RESISTANCE MEASUREMENTS (Cont)

TUBE	PIN NUMBER										PLATE CAP
		1	2	3	4	5	6	7	8	9	
V11	D-C V	80/98	-2.9	170/200	0	0	275/250	0	1.6/2.0	0	
	A-C V				6.3	0					
	Ohms	70K	70K	240K	0	0	20K	0	650	500K	
V12	D-C V	285/34	2.5/0.2	290/38	0	0	290/37	25/6.8	112/8.9	115/7	
	A-C V				6.3	0					
	Ohms	13.5K	1 meg	62K	0	0	240K	∞	7.4K	56K	
V13	D-C V	162/255	-14	189/175	0	0	290/270	0	1.7/0	0/-62	
	A-C V				6.3	0					
	Ohms	24K	1 meg	60K	0	0	12.8K	0	150	190K	
V14	D-C V	-1.0	0	1.1	0	0	0	92/85	0	0.7	
	A-C V				6.3	0					
	Ohms	19 meg	240K	19 meg	0	0	280K	100K	9.4K	340 Ω	
V15	D-C V	-1.5/-18	2.4/3.2	2.4/3.2	0	0	-1.5/-18	83/239	0/-62	-2.9/0	
	A-C V				6.3	0					
	Ohms	3.4 meg	5K	5K	0	0	3.3 meg	45K	1 meg	800	
V16	D-C V	2.4/3.3	1.6/2.5	90/100	0	0	2.0/0.15	0/-11	110/225	187/235	
	A-C V				6.3	0					
	Ohms	5K	2.4 meg	230K	0	0	70	790K	28K	15K	
V17	D-C V	0	1.0	0	0	0	-1.0	290/36	0/-64	-3.7/0	
	A-C V				0	6.3					
	Ohms	∞	1K	∞	0	0	4.2 meg	12.6K	100K	1.5K	

4.5 ALIGNMENT PROCEDURES.

4.5.1 TRANSMITTER CIRCUITS ALIGNMENT.

4.5.1.1 TEST EQUIPMENT REQUIRED. A signal generator, a vacuum-tube voltmeter, a general coverage communications receiver, and a 100-watt 50-ohm dummy load are required for complete alignment and neutralization. If only touch-up alignment is necessary, and if the transmitter develops 50 to 60 volts r-f at PA grids, alignment with PA grid current indication is satisfactory.

4.5.1.2 455-KC I-F ALIGNMENT. (Refer to figure 4-1 for location of adjustments.)

a. Disconnect the high voltage (800 volts) from the transmitter by removing the high-voltage rectifier tube from the power supply.

b. Disable the screen circuit of the PA tubes by unsoldering one end of the jumper between the P.A. DISABLE jacks, J5 and J6.

c. Connect the r-f probe of a vtvm across the mechanical filter input (junction of C15 and C14 at one of FL1 terminals). Refer to figure 6-2 for location of C15 and C14.

d. Set EMISSION switch to TUNE position. Set MIC GAIN full counterclockwise.

e. Any voltage appearing on the vtvm is due to carrier. Adjust carrier balance potentiometer R15 for minimum vtvm indication. This is a coarse adjustment.

f. Advance MIC GAIN control until vtvm indicates approximately one volt.

g. Peak primary and secondary of T1 for peak vtvm indication. Disconnect vtvm.

4.5.1.3 BAND-PASS I-F ALIGNMENT.

a. Connect signal generator output between pin 2 of the first mixer, V5, and ground. Connect r-f probe of vtvm between junction of C25 and R26 and ground. This point is in the grid circuit of the second transmit mixer, V6.

b. Tune the signal generator output to 3.055 mc. Make a swamping tool by connecting a 1000-ohm resistor and a 0.01-uf capacitor in series and connecting clips to their free pigtails. Connect this swamping tool across terminal 3 (secondary winding) of T2 and ground. This terminal is connected to the T2 end of coupling capacitor C25.

b. Resistances of less than one ohm listed as zero.

c. Voltage measurements made with the tube under test operating normally, J16 shorted to ground, no audio input to transmitter, no transmitter power output.

d. Resistance measurements made with power supply plug removed from J13.

e. All measurements made from tube socket pin to ground.

f. When two voltages are given for same tube pin, the first is for receive condition and the second for transmit condition.

WARNING

Do not attempt any measurements of power amplifier plate voltage without special high-voltage test probe. Voltage here is 800 volts d-c. Do not make any other voltage or resistance measurements on KWM-2 with high voltage applied. Remove high-voltage rectifier from socket in power supply.

TABLE 4-3. VOLTAGE AND RESISTANCE MEASUREMENTS

TUBE		PIN NUMBER									PLATE CAP
		1	2	3	4	5	6	7	8	9	
V1	D-C V	290/35	193/32	2.6/0	0	0	-1.47/-18.5	0.6	28/40	0.1	
	A-C V				6.3	0					
	Ohms	14K	40K	35K	0	0	4.4 meg	200	75K	1 meg	
V2	D-C V	279/259	0	298/275	0	0	285/263	21	128/115	127/112	
	A-C V				6.3	0					
	Ohms	14K	1.9 meg	110K	0	0	60K	∞	7K	60K	
V3	D-C V	280/27	160/26	0	0	0	-1.25/-18.5	0/10	-0.5/273	0	
	A-C V				6.3	0					
	Ohms	14K	39K	0	0	0	4.4 meg	900	10K	9	
V4	D-C V	-0.5/270	-0.2/95	0/2.1	0	0	-0.8	20/0	283/80	0/-0.6	
	A-C V				6.3	0					
	Ohms	10K	25K	750	0	0	3.5 meg	2K	27K	10 meg	
V5	D-C V	275/250	-62/0	0/1.8	0	0	280/255	-62/0	0/1.9	0	
	A-C V				0	0				6.3	
	Ohms	14K	540K	270	0	0	14K	540K	250	0	
V6	D-C V	-0.2/235	-0.7/0	0/1.7	0	0	-0.2/235	-0.7/0	0/1.8	0	
	A-C V				6.3	6.3				0	
	Ohms	12.5K	90K	240	0	0	12.5K	100K	230	0	
V7	D-C V	-1.4/-1.0	0	0	0	270/250	125/110	0			
	A-C V			0	6.3						
	Ohms	8 meg	0	0	0	13.2K	28K	0			
V8	D-C V	0/3	-62/0	-1.0/140	0	0	290/265	0	-1.0/140	-62/0	
	A-C V				0	6.3					
	Ohms	110	40K	34K	0	0	13K	0	34K	40K	
V9	D-C V	0	0	-0.16/245	0	-60	0	0	0		
	A-C V		0					6.3			
	Ohms	2	1.7	10K	2.2	47K	2.2	1.1	0		∞
V10	D-C V	0	0	-0.16/245	0	-60	0	0	0		
	A-C V							6.3			
	Ohms	2	1.7	10K	2.2	47K	2.2	1.1	0		∞

TABLE 4-2. RECEIVER SIGNAL LEVELS

TEST POINT	FREQUENCY	VOLTAGE
V15-B	455 kc	400,000 microvolts
V15B-9	455 kc	1.3 volts*
V3B-6	455 kc	8000 microvolts
V1B-6	455 kc	180 microvolts
V17B-9	2.5-2.7 mc	1.85 volts*
V17B-8	3.055 mc	90 microvolts

*Measured with vacuum-tube voltmeter.

TEST POINT	FREQUENCY	VOLTAGE
V13B-8	High-frequency oscillator injection signal (17.155 mc)	1.8 to 3.0 volts*
V13B-9	14.1 mc	110 microvolts
V7-1	14.1 mc	11 microvolts
J2 (RCVR ANT) or J1 (OUTPUT)	14.1 mc	2.2 microvolts

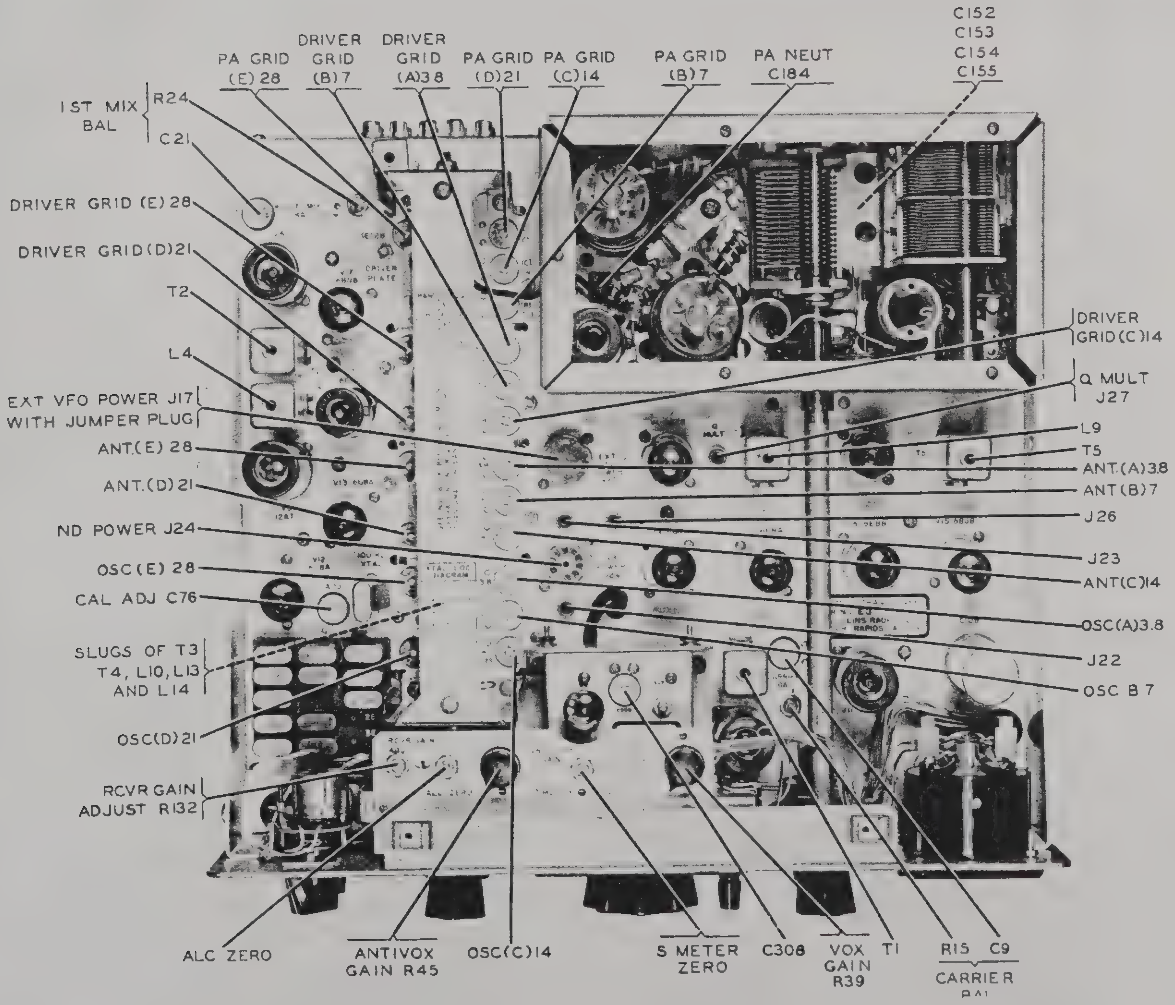


Figure 4-1. Locations of Test Points and Adjustments

TABLE 4-1. TRANSMITTER SIGNAL LEVELS (Cont)

TEST POINT	BAND-SWITCH POSITION	SIGNAL GENERATOR FREQUENCY	SIGNAL VOLTAGE AT TEST POINT
V7-1 (grid)	3.8	3.9 mc	42,000 microvolts
	7.2	7.3 mc	50,000 microvolts
	14.2	14.3 mc	110,000 microvolts
	21.4	21.5 mc	80,000 microvolts
	28A	28.6 mc	115,000 microvolts
	28B, 28C	According to crystal used	
V6-2 (grid)	14.2	3.055 mc	80,000 microvolts
V5-2 (grid)	14.2	3.055 mc	160,000 microvolts
V4A-6 (grid)	14.2	455 kc	36,000 microvolts
For following, disconnect signal generator, remove J16 short, set EMISSION switch to TUNE, and adjust MIC GAIN for grid current threshold. Measure with vtvm.			
V3A-7 (cathode)	Any	1350 cps*	36 millivolts
V3A-9 (grid)	Any	1350 cps*	85 millivolts
V11B-9 (grid)	Any	1350 cps*	40 millivolts
For following, turn EMISSION switch to USB, and connect audio oscillator to J11. Set MIC GAIN fully clockwise, and adjust audio oscillator output for PA grid current threshold. Measure input at J11 with a-c vtvm.			
V1A-9 (grid) or J11 PHONE PATCH	Any	1350 cps	11 millivolts
For following, measure at test point with vtvm.			
V6-3	3.6		1.5 volts
	7.0		1.5 volts
	14.0		1.5 volts
	21.2		1.5 volts
	38.5		1.5 volts
V5-2 or 7	Vfo set at 100		1.5 volts
Wiper of R15	Any		1.5 volts

*Frequency of internal tone oscillator.

4.3 RECEIVER SIGNAL TRACING.

Table 4-2 lists significant test points and normal signal levels. Figure 4-1 shows location of test points and adjustments. All r-f and i-f measurements were made by connecting a vacuum-tube voltmeter to the avc bus and increasing signal generator output until the avc threshold is reached. The avc threshold voltage is the point at which the d-c vtvm indication just changes with increased signal level. The receiver was tuned to 14.1 mc for these measurements and test signal injected at indicated test points. Signal voltage values are taken from signal generator output attenuator. All values are nominal and may vary ±20% without degrading performance.

4.4 VOLTAGE AND RESISTANCE MEASUREMENTS.

Table 4-3 lists voltage and resistance of all tube sockets of the KWM-2 except that of the vfo tube, V301. DO NOT OPEN the oscillator can. Measurements were made under the following conditions:

a. All measurements with vtvm and with all tubes in sockets. Unless otherwise noted in table, all measurements made with R.F. GAIN at maximum, A.F. GAIN at minimum, EMISSION switch in USB position, BAND switch in 14.2 position, vfo dial at 100, OFF-ON-NB-CAL switch in ON position. All voltages on transmitter tubes are taken with PTT jack J16 shorted to ground and MIC GAIN control full counterclockwise, but not far enough to close S14.

and to the crystal oscillator cathode follower. The cathode follower provides isolation and impedance match between the crystal oscillator and the receiver first mixer cathode. The output frequency of this oscillator is always 3.155 mc higher than the lower edge of the desired band. This high-frequency injection signal is the crystal fundamental frequency for all desired signals below 12 megacycles, but for operating frequencies higher than 12 mc, the crystal frequency is doubled in the plate circuit of the oscillator. Instructions for calculating crystal frequencies for the desired bands are given in section II.

3.4.5 CRYSTAL CALIBRATOR.

The 100-kc crystal calibrator, V12A, is the pentode section of a type 6U8A tube. Its output is coupled to the antenna coil, T3. The calibrator may be trimmed to zero beat with WWV (or any other desired frequency standard) by adjustment of capacitor C76.

3.5 VOX AND ANTI VOX CIRCUITS.

Audio output voltage from the second microphone amplifier, V11B, is coupled to the VOX GAIN control. R39. A portion of this voltage is amplified by vox amplifier V14B and fed to vox rectifier which is one of the diodes of V14. The positive d-c output of the vox rectifier is applied to the grid of vox relay amplifier V4B, causing it to conduct current and actuate the vox relay, K2. Contacts of K2 switch the receiver antenna lead, the other relay coils, and the -70-volt d-c muting and bias voltage. Relays K3 and K4 switch the metering circuits from receive to transmit, the low plate voltages from receive to transmit tubes, and the avc and alc leads.

The anti vox circuit provides a threshold voltage to prevent loudspeaker output (picked up by the microphone circuits) from tripping the KWM-2 into transmit function. Some of the receiver output audio voltage is connected through C235 to the ANTI VOX GAIN control, R45. Signal from the slider of this potentiometer is rectified by the anti vox rectifier, which is the other diode of V14. Negative d-c output voltage from the anti vox rectifier, connected to the grid of V4B, provides the necessary anti vox threshold. ANTI VOX GAIN control R45 adjusts the value of the anti vox voltage threshold so that loudspeaker output will not produce enough positive d-c output from the vox rectifier to exceed the negative d-c output from the anti vox rectifier and cause V4B to actuate K2. However, speech energy into the microphone will cause the positive vox voltage to overcome the negative anti vox voltage and produce the desired action of K2.

SECTION IV
SERVICE INSTRUCTIONS

4.1 GENERAL.

Included in this section are signal tracing procedures, alignment and neutralization procedures, and voltage and resistance measurements.

4.2 TRANSMITTER SIGNAL TRACING.

Table 4-1 lists significant test points and normal signal levels. Figure 4-1 shows location of adjustments. Before making measurements, set EMISSION switch to USB, and disable the power amplifier by disconnecting the jumper between J5 and J6 and removing the high-voltage rectifier tube from its socket. Set meter switch to GRID. Peak EXCITER TUNING and turn VOX GAIN control full counterclockwise. Short PTT jack J16 to ground to key the KWM-2 to transmit. Connect signal generator output to test points indicated in table 4-1, and adjust signal generator output attenuator until PA grid current just begins to show on the meter. Attenuator reading is signal voltage necessary at that point. Voltages given in the table are nominal and may vary plus or minus 20 percent. Be careful, each time, to set signal generator to frequency shown in the table. Oscillator output voltage may be measured with a vacuum-tube voltmeter.

TABLE 4-1. TRANSMITTER SIGNAL LEVELS

TEST POINT	BAND-SWITCH POSITION	SIGNAL GENERATOR FREQUENCY	SIGNAL VOLTAGE AT TEST POINT
V8-2 (grid)	3.8	3.9 mc	1.1 volts
	7.2	7.3 mc	0.7 volt
	14.2	14.3 mc	1.95 volts
	21.4	21.5 mc	1.4 volts
	10A	28.6 mc	1.8 volts

cancels the high-frequency injection signal energy within the mixer and translates the band-pass i-f signal to the desired operating band.

3.2.4 R-F CIRCUITS.

The slug-tuned circuits coupling V6 to V7, V7 to V8, and V8 to the power amplifier are ganged to the EXCITER TUNING control. The signal is amplified by the r-f amplifier, V7, and the driver, V8, to drive the power amplifier, V9 and V10. Output from the parallel power amplifiers is tuned by a pi-network and fed to the antenna through contacts of transmit-receive relay K3. Negative r-f feedback from the PA plate circuit to the driver cathode circuit permits a high degree of linearity at the high power level of the PA tubes. Both the driver and PA stages are neutralized to ensure stability. On signal peaks, the detected envelope from the PA grids is rectified by the alc rectifier, V17A. D-c output from V17A is filtered and used to control the gain of V4A and V7. This prevents overdriving the power amplifier.

3.3 RECEIVER CIRCUITS.

3.3.1 R-F CIRCUITS.

Signal input from the antenna is connected through relay contacts to the tuned input circuit, T3. The signal is applied from T3 to the grid of the receiver-transmitter r-f amplifier, V7. Amplified signal from V7 is applied from the tuned circuit consisting of L10 and band-switch-selected capacitors to the grid of the receiver first mixer, V13B.

3.3.2 RECEIVER MIXERS.

The input r-f signal is fed to the grid of V13B, and the high-frequency oscillator injection signal is fed to the cathode of V13B. The difference product of the first mixer is applied from the plate of the tube to variable i-f transformer T2. Output of T2 in the range of 2.955 to 3.155 megacycles is applied to the grid of the second receiver mixer, V17B, across parallel-tuned trap circuit Z5. This trap circuit minimizes a spurious response which would otherwise result from harmonics of the high-frequency crystal oscillator. When signal input is applied to the grid of V17B and vfo injection signal is applied to the cathode of V17B, the 455-kc difference product is fed from V17B plate to mechanical filter FL1.

3.3.3 I-F CIRCUITS.

The output from FL1 is applied to the grid of the first i-f amplifier, V1B. The i-f signal is amplified by V1B and V3B and applied through T5 to avc rectifier V15A and the grid of product detector V15B. Beat-frequency oscillator signal is applied to the cathode of V15B, and the product of mixing is the detected audio signal. Output of the avc rectifier circuit is applied to the two receiver i-f amplifiers and through contacts of relay K4 to the receiver-transmitter r-f amplifier. This avc voltage controls the gain of the receiver and prevents overloading.

3.3.4 A-F CIRCUITS.

Output from the product detector is applied through the A.F. GAIN control, R92, to the grid of the first a-f amplifier, V16A. Amplified audio output of V16A is coupled to the grid of the a-f output amplifier, V16B, which produces the power to operate speaker, headphones, or phone patch.

3.4 OSCILLATORS.

The transceiver contains five oscillators. They are the tone oscillator, the beat-frequency oscillator, the variable-frequency oscillator, the high-frequency crystal oscillator, and the crystal calibrator.

3.4.1 TONE OSCILLATOR.

The tone oscillator operates when the EMISSION switch is in LOCK, TUNE, or CW position. It is a phase-shift oscillator operating at approximately 1350 cps. Its output is fed to the transmitter audio circuits for tuneup signal and to the balanced modulator to produce a carrier frequency 1350 cps removed from the dial reading. This signal allows carrier to be applied to the power amplifier grids for CW or tuneup. Some of the output from the tone oscillator is applied to the receiver audio circuits for sidetone monitoring in CW operation.

3.4.2 BEAT-FREQUENCY OSCILLATOR.

The bfo is crystal controlled at either 453.650 or 456.350 kilocycles, depending upon whether Y16 or Y17 is selected by the EMISSION switch section S9H. The unused crystal is shorted out by this switch section. These crystal frequencies are matched to the pass band of the mechanical filter, FL1, so that the carrier frequency is placed approximately 20 db down on the skirts of the filter response. This 20-db carrier attenuation is in addition to the 30-db suppression provided by the balanced modulator.

3.4.3 VARIABLE-FREQUENCY OSCILLATOR.

The vfo operates in the range of 2.5 to 2.7 mc. The value of the cathode choke is selected so that switching a small trimmer across it shifts the oscillator frequency. This compensates for switching bfo frequency and keeps dial calibration accurate, no matter which sideband is selected. This bfo switching is done by applying a positive or negative bias to diode CR301. When the diode bias is positive, the diode impedance is lowered, and C308 is effectively in parallel with L304. When the bias is negative, diode impedance is high, and C308 is effectively switched out of the circuit.

3.4.4 HIGH-FREQUENCY CRYSTAL OSCILLATOR.

The high-frequency crystal oscillator, V13A, is crystal controlled by one of 14 crystals selected by BAND switch S2. Output from the high-frequency crystal oscillator is fed to the transmitter second mixer

TABLE 2-1. CRYSTAL FREQUENCIES AND OPERATING BANDS (Cont)

BAND-SWITCH POSITION	FREQUENCY BAND	CRYSTAL SUPPLIED	CRYSTAL SOCKET CONNECTED	TOTAL COVERAGE
1C - 14.0	14.0 - 14.2 mc	8.5775 mc	1C	
2C - 14.2	14.2 - 14.4 mc	8.6775 mc	2C	C 9.5 - 15.0 mc
3C - 14.8	14.8 - 15.0 mc	8.9775 mc	3C	
1D - 21.0	21.0 - 21.2 mc	12.0775 mc	1D	
2D - 21.2	21.2 - 21.4 mc	12.1775 mc	2D	D 15.0 - 22.0 mc
3D - 21.4	21.4 - 21.6 mc	12.2775 mc	3D	
1E - 28A	28.5 - 28.7 mc	15.8725 mc	1E	
2E - 28B	As selected	Not furnished	2E	E 22.0 - 30.0 mc
3E - 28C	As selected	Not furnished	3E	

SECTION III
PRINCIPLES OF OPERATION

3.1 BLOCK DIAGRAM.

Refer to figure 3-1. The KWM-2 is an SSB or CW transceiver operating in the range between 3.4 and 30.0 mc. It consists of a double-conversion receiver and a double-conversion exciter-transmitter. The transmitter and receiver circuits use common oscillators, common mechanical filter, and common r-f amplifier. The transmitter low-frequency i-f and the receiver low-frequency i-f is 455 kc. The high-frequency i-f for both is 2.955 to 3.155 mc. This is a band-pass i-f which accommodates the full 200-kc bandwidth. Figure 7-1 is a schematic diagram of the KWM-2, and figure 7-2 is a schematic diagram of the 516F-2 Power Supply.

3.2 TRANSMITTER CIRCUITS.

3.2.1 A-F CIRCUITS.

Microphone or phone-patch input is connected to the grid of the first audio amplifier V1A, amplified, and coupled to the grid of the second audio amplifier, V11B. Output from V11B is coupled to the grid of cathode follower V3A through the MIC GAIN control, R8. Output from the cathode follower is fed to the resistive balance point of the balanced modulator. In TUNE, LOCK, and CW positions of the EMISSION switch, output from the tone oscillator, V2B, is fed to the grid of the second audio amplifier. Amplifier tone oscillator signal is taken from the plate of V11B to the grid of the vox amplifier to activate the vox circuits in CW operation. This signal is also fed to the grid of the first receiver a-f amplifier, V16A, for CW monitoring.

3.2.2 BALANCED MODULATOR AND LOW-FREQUENCY I-F CIRCUITS.

Audio output from the cathode of V3A and the bfo voltage are fed to the wiper of the carrier balance potentiometer, R15. Both upper and lower sideband outputs from the balanced modulator are coupled through i-f transformer T1 to the grid of the i-f amplifier, V4A. Output from the i-f amplifier is fed to the mechanical filter, FL1. The pass band of FL1 is centered at 455 kc. This passes either upper or lower sideband, depending upon the sideband polarity selected when the EMISSION switch connects bfo crystal Y16 or Y17. The signal-sideband output of FL1 is connected to the grids of the first transmitter mixer in push pull.

3.2.3 BALANCED MIXERS.

The 455-kc single-sideband signal is fed to the first balanced mixer grids in push pull. The plates of the mixer are connected in push pull, and vfo signal is fed to the two grids in parallel. The mixer cancels the vfo signal energy and translates the 455-kc single-sideband signal to a 2.955- to 3.155-mc single-sideband signal. The coupling network between the plates of the first mixer and the grid of the second balanced mixer is broadbanded to provide a uniform response to the band-pass i-f frequency. The transmit frequency is determined within the pass band by the vfo frequency. The band-pass i-f signal is fed to one of the grids of the second balanced mixer, and the high-frequency injection signal energy from crystal oscillator V13A is fed to the signal input cathode and to the other grid. This arrangement

undesirable vox switchover. Set VOX GAIN and ANTI-VOX GAIN controls full counterclockwise before installation. If vox operation is desired, leave clearance in installation so top cover can be opened. For mobile operation, load the power amplifier to 210 ma plate current.

2.3 OPERATION OUTSIDE AMATEUR BANDS.

All amateur bands are completely covered except the 10-meter band for which only one crystal is furnished (for 28.5 to 28.7 mc). Two extra sockets are provided for additional crystals in the 10-meter band.

The transmitter can be operated at other frequencies outside the specified amateur bands (MARS frequencies) or at other 10-meter frequencies by plugging the proper crystals into the mounting board. Operation at frequencies outside the amateur bands will result in slightly decreased receiver sensitivity and transmitter PA grid drive, unless the tuned circuits of the transceiver are retuned to peak their responses in the desired portions of the high-frequency spectrum. For operation outside amateur bands, disregard the amateur band markings on the EXCITER TUNING and P.A. TUNING scales and use the logging scales. Figure 2-2 shows logging scale calibration curves, and figure 2-3 shows crystal socket locations. Select these crystals as follows:

a. If the lower edge of the desired 200-kc band is less than 11.8 mc, the required frequency is equal to the lower edge of the desired band plus 3.155 mc. As an example, if the desired band is 4.0 to 4.2 mc, 4.0 mc plus 3.155 mc equals 7.155 mc.

b. If the lower edge of the desired 200-kc band is 12.00 mc or higher, the required crystal frequency is half the sum of the lower edge of the desired band and 3.155 mc. As an example, if the desired band is 14.4 to 14.6 mc,

$$\frac{14.4 + 3.155}{2} = 8.7775 \text{ mc.}$$

The plate circuit of the oscillator is tuned to twice the crystal frequency when required injection frequencies are this high.

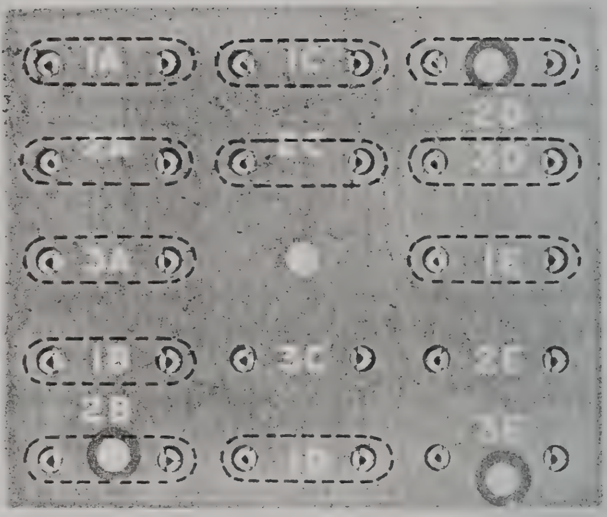


Figure 2-3. Crystal Socket Locations

CAUTION

Avoid transmitter operation between 5.0 and 6.5 mc. In this range, the second harmonic of the variable i-f frequency is nearly the same as desired frequency. In transmit function, some of this energy will pass through the tuned circuits and become spurious emission.

c. Substitute or extra crystals should be plugged into the appropriate socket on the mounting board according to the best location in one of the five bands. The example cited, in step b above, should place the crystal in one of the sockets marked C. If two additional 10-meter crystals are used, they should be plugged into the sockets marked E. Table 2-1 lists crystal socket designations, switch positions (BAND), crystal frequencies furnished, and frequency range limitations. For extra coverage crystals available, see section VI, Parts List.

TABLE 2-1. CRYSTAL FREQUENCIES AND OPERATING BANDS

BAND-SWITCH POSITION	FREQUENCY BAND	CRYSTAL SUPPLIED	CRYSTAL SOCKET CONNECTED	TOTAL COVERAGE
1A - 3.4	3.4 - 3.6 mc	6.555 mc	1A	A 3.4 - 5.0 mc
2A - 3.6	3.6 - 3.8 mc	6.7555 mc	2A	
3A - 3.8	3.8 - 4.0 mc	6.955 mc	3A	
1B - 7.0	7.0 - 7.2 mc	10.155 mc	1B	B 6.5 - 9.5 mc
2B - 7.2	7.2 - 7.4 mc	10.355 mc	2B	

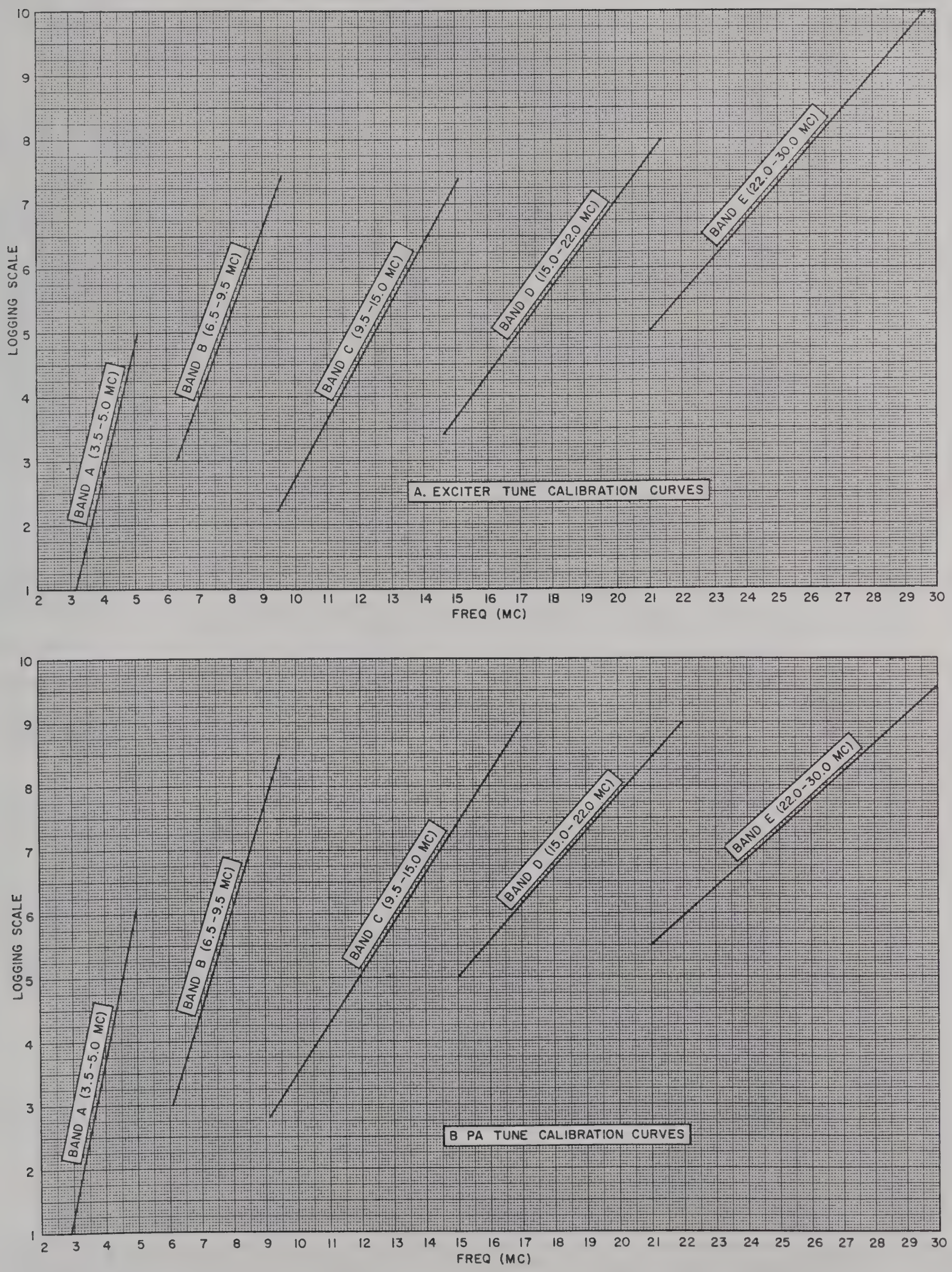


Figure 2-2. Logging Scale Calibration Curves

2.2 TRANSMITTING TUNING.

2.2.1 GENERAL.

a. Set up for receive function as in paragraph 2.1.

b. Set EMISSION switch (2) to TUNE position. Set P.A. TUNING control (7) to white portion of dial indicating the desired band.

c. Set meter switch (8) to PLATE position. Advance the MIC GAIN control (4) full clockwise, and rock the EXCITER TUNING control (6) until maximum plate current is obtained. Dip the plate current immediately with the P.A. TUNING control (7), and return the MIC GAIN control (4) to full counterclockwise position.

d. Set the meter switch (8) to GRID position. Advance MIC GAIN control (4) until grid current is obtained. Rock the EXCITER TUNING control (6) to obtain a peak in grid current indication. After grid current ~~has been peaked with the EXCITER TUNING control (6), adjust MIC GAIN control (4) to set grid current to full scale on meter.~~

e. Set the EMISSION switch (2) to LOCK position.

f. Adjust MIC GAIN setting (4) to 3/4 full scale.

g. Set meter switch (8) to PLATE position.

h. Alternately dip plate current with P.A. TUNING control (7), and increase loading with INCR LOAD control (9) until plate current is 230 ma at the dip.

i. Set EMISSION switch (2) to desired sideband or to CW position.

CAUTION

If transceiver frequency is changed by any great amount, be sure to redip the power amplifier plate current and check the loading. This will be most important on the 80- and 40-meter bands. Some operating experience will indicate the amount of frequency excursion possible without readjustment.

2.2.2 SINGLE-SIDEBAND OPERATION.

a. Set up receiver operation and transmitter operation completely as in paragraphs 2.1 and 2.2.1.

b. Close-talk into the microphone, increasing VOX GAIN control setting until vox relay just operates. For vox operation, it is desirable to close-talk the microphone to prevent background noises from tripping the KWM-2 into transmit function.

c. Set meter switch (8) to ALC position. Increase setting of MIC GAIN control (4) to obtain S6 average reading on voice.

d. Leave MIC GAIN control (4) as set in step c above. Leave microphone in normal operating position. Set function switch to CAL position, tune in calibrate signal, and adjust A.F. GAIN control (5) for comfortable listening level.

e. Adjust the tuning control for approximately 1000-cps beat note. If the vox relay trips, increase ANTI VOX GAIN setting to minimum point necessary to prevent speaker output from tripping vox. It may be necessary to increase VOX GAIN setting slightly after this anti vox gain adjustment in order to compensate for the anti vox gain.

NOTE

Do not use more vox gain nor more anti vox gain than necessary to control vox operation.

f. Set function switch to ON position. The KWM-2 is now ready for transmit operation in SSB service. Speaking into the microphone transfers from receive function to transmit function through the vox circuit action. If the receiver is tuned to a different frequency, the transmitter is tuned to the new frequency. After changing frequency on the lower bands (3.4 to 4.0 mc), switch EMISSION switch (2) to LOCK position and make the following checks: Switch meter switch (8) to GRID position, and rock the EXCITER TUNING control (6) gently to check that PA grid drive current is peaked. Switch the meter switch (8) to PLATE, and check the dip in PA plate current with the P.A. TUNING control (7). Set the EMISSION switch back to the desired sideband position and make the call.

2.2.3 CW OPERATION.

a. Set up receiver and transmitter operation completely as in paragraphs 2.1 and 2.2.1.

b. Depress key and adjust A.F. GAIN control (5) for comfortable monitoring level.

c. Hold key down, and increase VOX GAIN control setting until the vox relay operates.

d. Set meter switch (8) to ALC position. While sending a series of dots, adjust MIC GAIN control (4) for S2 meter indication of alc.

e. Set the function switch to ON.

f. When receiving, leave the A.F. GAIN control (5) set for comfortable monitoring level, and adjust the receive level with the R.F. GAIN control (10). When the KWM-2 is receiving, the received signal is indicated in S units. The S-meter will read correctly with the R.F. GAIN (10) at less than maximum setting, provided the received signal level is high enough to kick the S-meter. For example, if the R.F. GAIN control (10) is set for no-signal reading of S8 and kicks to S9 with signal, the received signal is S9.

NOTE

The CW output signal frequency is 1350 cps higher than the dial reading.

2.2.4 MOBILE OPERATION.

The vox and anti vox circuits will operate in mobile operation, but push-to-talk operation is recommended, since high-level background noises will produce

SECTION II
OPERATION

2.1 RECEIVER TUNING.

a. Set function switch (1) to ON. This is the switch labeled OFF-ON-NB-CAL.

b. Set EMISSION switch (2) to desired sideband (USB or LSB position). Set BAND switch (3) to desired band.

c. Set the MIC GAIN control (4) full counterclockwise. Set R.F. GAIN control (10) full clockwise.

d. Set VOX GAIN control (under top cover) full counterclockwise.

e. Set ANTI VOX GAIN control (under top cover) full counterclockwise.

f. Adjust the A.F. GAIN control (5) until some receiver noise is heard in speaker.

g. Adjust the EXCITER TUNING control (6) to peak the receiver noise output. The transceiver is now ready to receive and the selected 200-kc band may be tuned with the tuning control. Dial frequency can be determined by adding the dial reading to the BAND switch (3) setting.

h. Turn function switch to CAL position. Tune dial to nearest 100-kc point (0, 100, or 200), and decrease R.F. GAIN control (10) as necessary for comfortable listening level. Adjust tuning until the calibrate signal is zero beat. When the calibrate signal is zero beat in the receiver, set the hairline on the 100-kc mark with the zero set knob. Set function switch (1) to ON and tune dial to the desired portion of the 200-kc band selected. If checking calibrate circuit against WWV is desired, see section IV, paragraph 4.5.2.3.

WARNING

DO NOT operate transmit circuits while the KWM-2 is tuned to receive outside the amateur band in use. The KWM-2 transmit frequency is always locked to the receive frequency. If the receiver is tuned into the foreign DX band and push-to-talk or vox action is initiated (with modulation) the transmit frequency will be out of the band. Keep the transceiver tuned within the band, or return tuning to within band before transmitting.

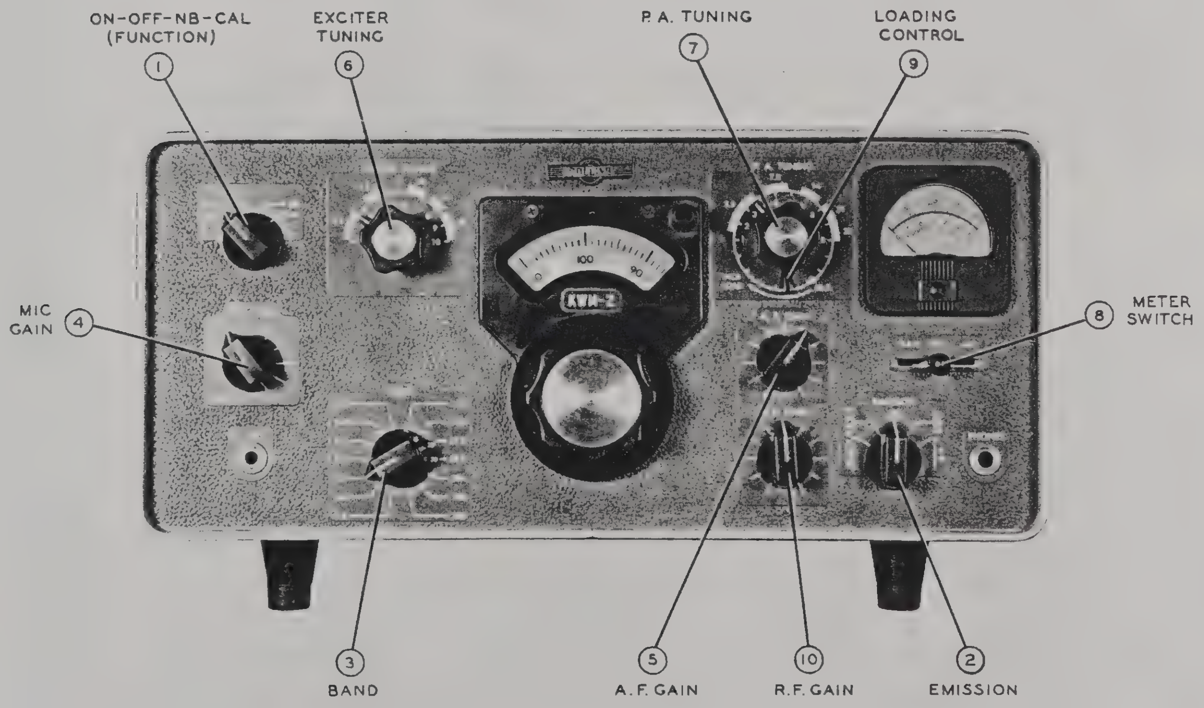
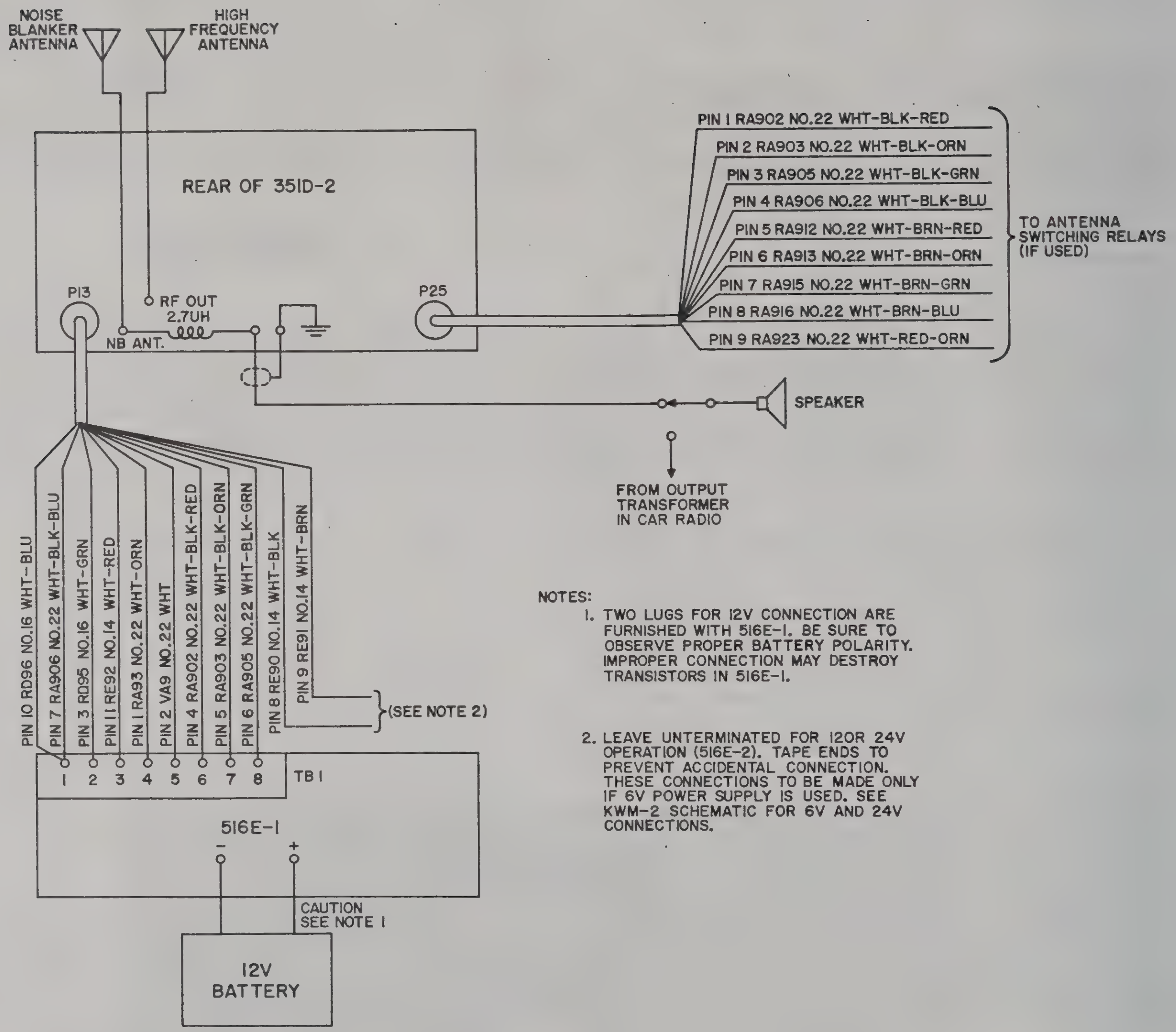


Figure 2-1. Front Panel Controls

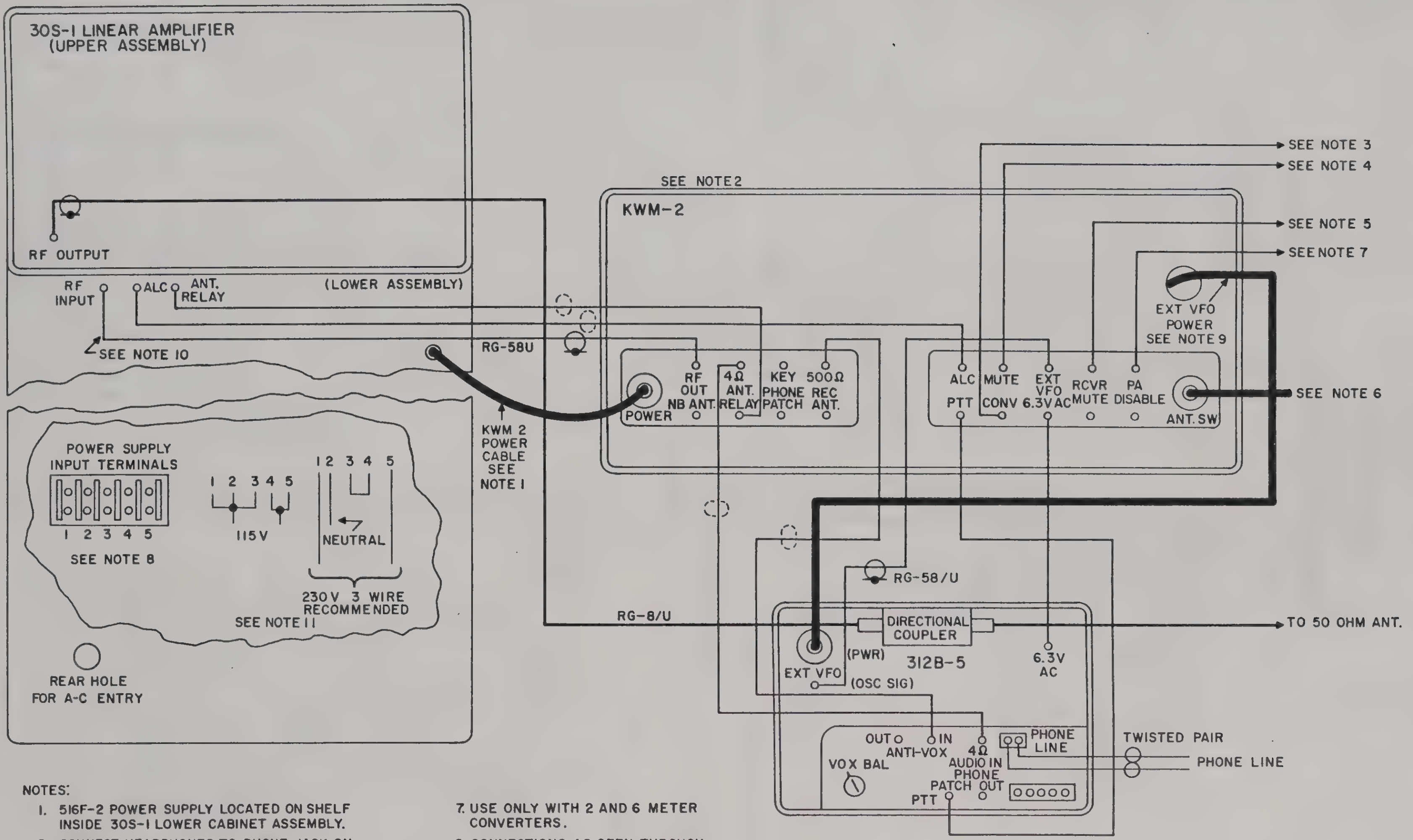

NOISE BLANKER ANTENNA
HIGH FREQUENCY ANTENNA
REAR OF 351D-2
P13
RF OUT
2.7UH
NB ANT.
P25
PIN 1 RA902 NO.22 WHT-BLK-RED
PIN 2 RA903 NO.22 WHT-BLK-ORN
PIN 3 RA905 NO.22 WHT-BLK-GRN
PIN 4 RA906 NO.22 WHT-BLK-BLU
PIN 5 RA912 NO.22 WHT-BRN-RED
PIN 6 RA913 NO.22 WHT-BRN-ORN
PIN 7 RA915 NO.22 WHT-BRN-GRN
PIN 8 RA916 NO.22 WHT-BRN-BLU
PIN 9 RA923 NO.22 WHT-RED-ORN
TO ANTENNA SWITCHING RELAYS (IF USED)
SPEAKER
FROM OUTPUT TRANSFORMER IN CAR RADIO
PIN 10 RD96 NO.16 WHT-BLU
PIN 7 RA906 NO.22 WHT-BLK-BLU
PIN 3 RD95 NO.16 WHT-GRN
PIN 11 RE92 NO.14 WHT-RED
PIN 1 RA93 NO.22 WHT-ORN
PIN 2 VA9 NO.22 WHT
PIN 4 RA902 NO.22 WHT-BLK-RED
PIN 5 RA903 NO.22 WHT-BLK-ORN
PIN 6 RA905 NO.22 WHT-BLK-GRN
PIN 8 RE90 NO.14 WHT-BLK
PIN 9 RE91 NO.14 WHT-BRN
(SEE NOTE 2)
1 2 3 4 5 6 7 8
TB 1
516E-1
-
+
CAUTION SEE NOTE 1
12V BATTERY

NOTES:

1. TWO LUGS FOR 12V CONNECTION ARE FURNISHED WITH 516E-1. BE SURE TO OBSERVE PROPER BATTERY POLARITY. IMPROPER CONNECTION MAY DESTROY TRANSISTORS IN 516E-1.

2. LEAVE UNTERMINATED FOR 12OR 24V OPERATION (516E-2). TAPE ENDS TO PREVENT ACCIDENTAL CONNECTION. THESE CONNECTIONS TO BE MADE ONLY IF 6V POWER SUPPLY IS USED. SEE KWM-2 SCHEMATIC FOR 6V AND 24V CONNECTIONS.

Figure 1-3. Mobile Station Interconnections



NOTES:

1. 516F-2 POWER SUPPLY LOCATED ON SHELF INSIDE 30S-1 LOWER CABINET ASSEMBLY.
2. CONNECT HEADPHONES TO PHONE JACK ON FRONT OF KWM-2. CONNECT MICROPHONE TO MIC JACK ON FRONT OF KWM-2.
3. USE ONLY WITH 2 AND 6 METER CONVERTERS. (CAUTION +275V DC PRESENT HERE)
4. TO EXTERNAL SWITCH IF CONVERTERS ARE HERE.
5. TO EXTERNAL RECEIVER, IF USED.
6. CABLE TO ANTENNA SWITCHING RELAYS. (IF USED)
7. USE ONLY WITH 2 AND 6 METER CONVERTERS.
8. CONNECTIONS AS SEEN THROUGH FRONT DOOR ON LOWER ASSEMBLY.
9. EXTERNAL VFO POWER CABLE PLUGS INTO J17 ON CHASSIS.
10. THIS CABLE IS FURNISHED WITH 30S-1 IN 20.5 FT LENGTH. DO NOT CUT.
11. 10 FT LENGTH OF 3 WIRE (EACH NO. 12) CONDUCTOR WITH LUGS ON ONE END. CONNECT OTHER END TO SWITCHBOX OR PLUG AS DESIRED.

Figure 1-2. High-Power Station Interconnections

SECTION I
INSTALLATION

1.1 UNPACKING.

Open carton carefully to avoid damaging transceiver. Carefully lift the transceiver out of the packing material. Examine for visible damage. If transceiver has been damaged in shipment, save box and packing material and notify the transportation company. Look for warranty card inside the unit. Fill out and mail the customer service card. Check that all tubes and crystals are properly seated in sockets. Check tuning controls and switches for freedom of action. Remove shipping blocks from 516F-2 Power Supply and plug in tubes.

1.2 MOUNTING AND CABLING.

1.2.1 GENERAL.

For fixed station installation, refer to figure 1-1 or 1-2. For mobile installation, refer to figure 1-3.

1.2.2 FIXED STATION INSTALLATION.

Connect associated equipment to the KWM-2 as shown in figure 1-1 or 1-2.

1.2.3 MOBILE INSTALLATION.

a. Select location in car, and mount KWM-2. Allow clearance on all sides to assure adequate ventilation. If vox operation is desired, leave enough space above the KWM-2 to allow opening the top cover for adjustment of VOX and ANTI-VOX gain controls, S-meter zero, etc. Drill holes and mount adapter bracket to transmission hump with self-tapping screws. Mount the 351D-2 Mobile Mount to the bracket. Swing the cantilever supports forward. Remove the plastic dust covers from the 351D-2 plugs, and store them in the recesses of the mount. Slide the KWM-2 onto the mount and push back until the mount plugs have entered the transceiver sockets. Tighten the wing nuts on the sides of the KWM-2. See 351D-2 Instruction Sheet for mobile mount installation.

b. Select location in car for mounting the 516E-1 Power Supply. This location must be as clean and dry as possible. Location in luggage compartment, under seat, or on passenger side of fire wall is satisfactory. DO NOT MOUNT IN ENGINE COMPARTMENT.

c. Determine necessary length of power cable (furnished with 351D-2 Mobile Mount) to connect the 516E-1 to the KWM-2, and cut to required length. Connect power supply, speaker, and microphone as shown in figure 1-3.

CAUTION

> Be sure to observe correct polarity of car battery when making connections to the 12-volt terminals of power supply. DO NOT connect the 516E-1 Power Supply to a system which has a positive ground. To do so will destroy all six transistors in the power supply. A special power supply (part number 522 0846 025) is available for 12-volt positive ground operation.

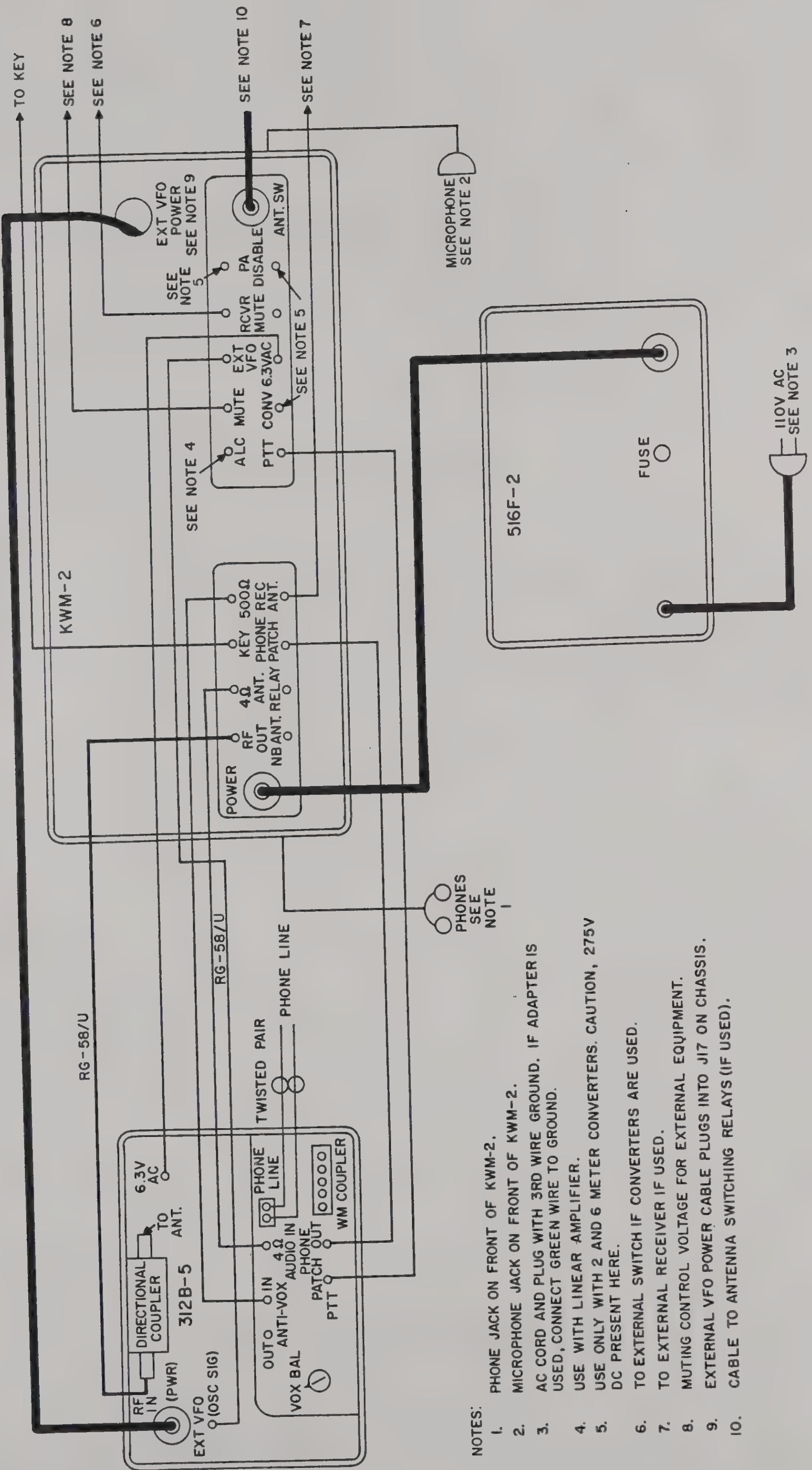
After the power cable and 12-volt power leads are connected, replace the terminal board cover on the power supply.

d. No mobile speaker is supplied. Connect the terminals of the car speaker as shown in figure 3. Break voice coil lead, and install a switch for transfer of speaker from car radio to KWM-2.

e. For suppression of noise encountered in mobile operation, the following suggestions may be helpful. Use resistor-type spark plugs, and install coaxial bypass capacitors at ignition coil, generator and voltage regulator leads. Use bracket-mounted coaxial capacitors in the battery and generator leads to the voltage regulator and a 0.005-microfarad (or smaller) disk ceramic or mica capacitor from the field lead to ground. If capacitor bypasses are not satisfactory here, remove them, and use chokes in series with the leads from field and armature terminals of generator. Place these chokes as close to the voltage regulator as possible. For the field lead choke, wind 12 turns of no. 18 wire on a 1/4-inch powdered iron core. For the armature lead, wind 12 turns of no. 14 or larger wire on a 1/4-inch powdered iron core. If bypass capacitor is used from field lead (to regulator) to ground, do not use larger value than 0.005 uf unless a 4-ohm resistor is placed in series with it. Ground the rear end of the exhaust pipe to the car body, using copper braid. General information concerning the problem of ignition noise and suggested methods of noise suppression are available in current handbooks.

1.3 INITIAL CHECKS. (Refer to figure 2-1.)

Set MIC GAIN control (4) full counterclockwise, meter switch (8) to PLATE position, and EMISSION switch (2) to LOCK. Read the no-signal PA plate current. It should be approximately 40 ma. If plate current is other than 40 ma, adjust BIAS ADJUST potentiometer on power supply chassis to set plate current at 40 ma.



NOTES:

1. PHONE JACK ON FRONT OF KWM-2.
2. MICROPHONE JACK ON FRONT OF KWM-2.
3. AC CORD AND PLUG WITH 3RD WIRE GROUND. IF ADAPTER IS USED, CONNECT GREEN WIRE TO GROUND.
4. USE WITH LINEAR AMPLIFIER.
5. USE ONLY WITH 2 AND 6 METER CONVERTERS. CAUTION, 275V DC PRESENT HERE.
6. TO EXTERNAL SWITCH IF CONVERTERS ARE USED.
7. TO EXTERNAL RECEIVER IF USED.
8. MUTING CONTROL VOLTAGE FOR EXTERNAL EQUIPMENT.
9. EXTERNAL VFO POWER CABLE PLUGS INTO J17 ON CHASSIS.
10. CABLE TO ANTENNA SWITCHING RELAYS (IF USED).

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INSTRUCTION BOOK

KWM-2
TRANSCEIVER

520 5964 00
2nd EDITION, 1 OCTOBER 1959

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1959

CEDAR RAPIDS, IOWA, U.S.A.

PRINTED IN THE UNITED STATES OF AMERICA

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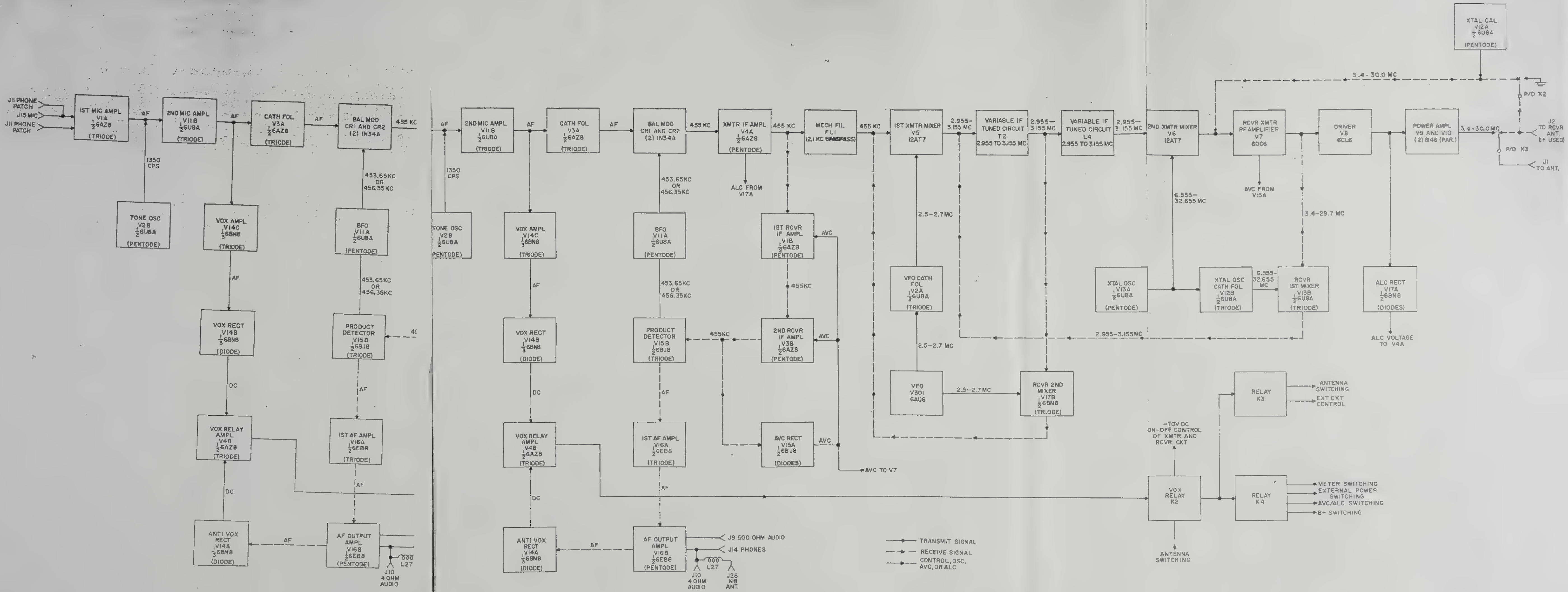
J11 PHONE PATCH
J15 MIC
J11 PHONE PATCH
1ST MIC AMPL V1A ½6AZ8 (TRIODE)
AF
1350 CPS
TONE OSC V2B ½6U8A (PENTODE)
2ND MIC AMPL V11B ½6U8A (TRIODE)
VOX AMPL V14C ⅓6BN8 (TRIODE)
VOX RECT V14B ⅓6BN8 (DIODE)
DC
VOX RELAY AMPL V4B ½6AZ8 (TRIODE)
ANTI VOX RECT V14A ⅓6BN8 (DIODE)
CATH FOL V3A ½6AZ8 (TRIODE)
BAL MOD CR1 AND CR2 (2) 1N34A
455 KC
453.65KC OR 456.35KC
BFO V11A ½6U8A (PENTODE)
PRODUCT DETECTOR V15B ½6BJ8 (TRIODE)
1ST AF AMPL V16A ½6EB8 (TRIODE)
AF OUTPUT AMPL V16B ½6EB8 (PENTODE)
J9 500 OHM AUDIO
J14 PHONES
L27
J10 4 OHM AUDIO
J28 NB ANT.
XMTR IF AMPL V4A ½6AZ8 (PENTODE)
ALC FROM V17A
MECH FIL FL1 (2.1 KC BANDPASS)
1ST RCVR IF AMPL V1B ½6AZ8 (PENTODE)
AVC
455KC
2ND RCVR IF AMPL V3B ½6AZ8 (PENTODE)
AVC RECT V15A ½6BJ8 (DIODES)
AVC TO V7
1ST XMTR MIXER V5 12AT7
2.955–3.155 MC
VARIABLE IF TUNED CIRCUIT T2 2.955 TO 3.155 MC
VARIABLE IF TUNED CIRCUIT L4 2.955 TO 3.155 MC
2.5–2.7 MC
VFO CATH FOL V2A ½6U8A (TRIODE)
VFO V301 6AU6
RCVR 2ND MIXER V17B ½6BN8 (TRIODE)
2ND XMTR MIXER V6 12AT7
6.555–32.655 MC
XTAL OSC V13A ½6U8A (PENTODE)
XTAL OSC CATH FOL V12B ½6U8A (TRIODE)
RCVR 1ST MIXER V13B ½6U8A (TRIODE)
2.955–3.155 MC
XTAL CAL V12A ½6U8A (PENTODE)
3.4-30.0 MC
RCVR XMTR RF AMPLIFIER V7 6DC6
AVC FROM V15A
3.4–29.7 MC
DRIVER V8 6CL6
POWER AMPL V9 AND V10 (2) 6146 (PAR.)
3.4-30.0 MC
P/O K2
P/O K3
J2 TO RCVR ANT. (IF USED)
J1 TO ANT.
ALC RECT V17A ½6BN8 (DIODES)
ALC VOLTAGE TO V4A
RELAY K3
ANTENNA SWITCHING
EXT CKT CONTROL
–70V DC ON-OFF CONTROL OF XMTR AND RCVR CKT
VOX RELAY K2
ANTENNA SWITCHING
RELAY K4
METER SWITCHING
EXTERNAL POWER SWITCHING
AVC/ALC SWITCHING
B+ SWITCHING
TRANSMIT SIGNAL
RECEIVE SIGNAL
CONTROL, OSC, AVC, OR ALC

Figure 3-1. KWM-2 Transceiver, Block Diagram

ADDENDUM

KWM-2 TRANSCEIVER INSTRUCTION BOOK (Second Edition)

Mark the following changes in your KWM-2 Instruction Book.

1. Page iv. Figure 1-1. Under power cable from 516F-2 to KWM-2, write -- CAUTION. See Note 11. Add to notes: 11. Be sure to plug 516F-2 into KWM-2 BEFORE plugging 516F-2 into a-c line.

2. Page 1. Change paragraph 1.3 to read:
Set MIC GAIN control (4) full counterclockwise until the switch clicks. Set OFF-ON-NB-CAL switch (1) to ON. Set meter switch (8) to PLATE position, and EMISSION switch (2) to LOCK. The transceiver is in receive condition during warmup, so the meter will read full scale until filaments have come to temperature. This is normal S-meter action. When the S-meter falls back to zero, the circuits will have switched to transmit condition, and the meter will indicate PA plate current. Read the no-signal PA plate current. It should be approximately 40 ma. If plate current is other than 40 ma, adjust BIAS ADJUST potentiometer on top rear of power supply chassis to set plate current to 40 ma.

3. Page 2. Figure 1-2. Add after note 1: CAUTION - Be sure KWM-2 is connected to 516F-2 BEFORE any a-c power is applied.

4. Page 4. Paragraph 2.1, step g. Change first sentence to read: Adjust the EXCITER TUNING control (6) to white portion of scale indicating the desired band. Rock this control slightly to peak the receiver noise output.

5. Page 5. Paragraph 2.2.1. Delete last sentence of step d. Paragraph 2.2.3. Move step e to first step of procedure and change to read: a. Set the function switch (1) to ON.

6. Page 17. Change paragraph 4.5.1.3 to read:

4.5.1.3 BAND-PASS I-F ALIGNMENT.

a. Turn on KWM-2. Set EMISSION switch to TUNE. Tune and load KWM-2 into a dummy load at 14.3 mc. Switch meter to GRID position.

b. Make a swamping tool by connecting a 1000-ohm resistor and a 0.01-uf capacitor in series and connecting clips to their free pigtails. Connect this swamping tool across terminal 3 (secondary winding) of T2 to ground. This terminal is connected to the T2 end of coupling capacitor C25.

c. Keep grid current to approximately mid-scale or lower by adjusting MIC GAIN control, and peak the primary of T2 with tuning tool such as Walsco 2543. The primary slug for T2 is at the bottom of the can. Use grid current as peak indication.

d. Remove the swamping tool from the secondary of T2, and connect it across the primary of T2 (between pins 1 and 6 of the first mixer, V5). Peak the secondary of T2 (slug at top of shield can). Remove the swamping tool.

e. Retune and reload the KWM-2 to 14.255 mc. Without swamping any of the tuned circuits, peak L4 for grid current indication.

ADDENDUM TO KWM-2 INSTRUCTION BOOK

2nd Edition

1. Page 8. Table 2-1. For bandswitch position 1E-28A, Crystal Supplied frequency, change to 15.8275 mc.

2. Page 19. Add at end of Section IV.

4.6 DIAL CORD REPLACEMENT. Refer to figure 4-2.

4.6.1 BANDSWITCH CORD.

a. Place BAND switch in position 2A. Remove all power from KWM-2 and remove the PA compartment top cover. Short the PA plates to ground with a screwdriver blade. Check to see that the movable contacts of both S7 and S8 are at position 13 and 14. This may be determined by counting clockwise on the wafer from the X-mark, looking at the wafer on the side marked with the X, and beginning with the first position clockwise from the X-mark as 1. Count all positions, including the holes in the empty spaces where there are no lugs mounted.

b. Use a knife blade or small screwdriver and pry the tab open far enough to release the old cord. This tab is located on the inner face of the pulley. Remove the broken or defective cord from the bandswitch pulleys near the front panel. One is located above the chassis and the other below the chassis. Loosen the idler pulley so it will not be in the way during restringing.

c. Replace the old cord with three feet of new cord from Collins part number 432 1009 00. When ordering dial cord, be sure to state the desired length in feet.

d. String the cord according to the appropriate part of figure 4-2. Make sure the cord turns do not overlap on the pulleys. Pull the cord tight and tie to the tab. Mash the tab down to clamp the cord securely. Tighten the idler to bring the cord to tension.

e. Check again that the switch sections S7 and S8 are properly positioned according to the instructions of step a above. If they are not, loosen the shaft coupler and turn the switch shaft to bring the contacts to proper position. Tighten the shaft coupler.

f. Dab a little airplane cement on the dial cord knots to help keep them tight. After the cement is dry, trim the loose ends back NO CLOSER than 1/2 inch from the knots.

4.6.2 LOADING CAPACITOR CORD.

a. Place INCR LOAD control at 10 on the logging scale. This positions the INCR LOAD control horizontally and points it at the meter. Remove all power from the KWM-2 and remove the PA compartment top cover. Short the PA

plate caps to ground with a screwdriver blade. Check that the loading capacitor is fully meshed. If not, position the capacitor plates manually so they are fully meshed.

b. Use a knife or small screwdriver and pry the tab open far enough to release the old cord. Remove the broken or defective dial cord from the loading capacitor pulleys.

c. Replace the old cord with two feet of new cord from Collins part number 432 1009 00. When ordering dial cord, be sure to state the desired length in feet.

d. String the cord according to the appropriate part of figure 4-2. Make sure the cord turns do not overlap on the pulleys. Pull the cord tight and tie to the tab. Mash the tab down to clamp the cord securely.

e. Check to see that the INCR LOAD control is at 10 on the logging scale, and that the loading capacitor is fully meshed. If not, loosen the shaft coupler, mesh the capacitor plates manually, and tighten the coupler.

f. Dab a little airplane cement on the knots in the dial cords to help hold them tight. After the cement is dry, trim the loose ends back NO CLOSER than 1/2 inch from the knots.

COLLINS RADIO COMPANY
CEDAR RAPIDS, IOWA

FIELD SERVICE

AMATEUR SERVICE INFORMATION LETTER

DATE: 11-15-60
Page 1 of 2

EQUIPMENT TYPE: KWM-2

SUBJECT: SERVICING INFORMATION

From time to time Field Service Bulletins are published which require location and identification of components and terminal arrangement in Transceiver KWM-2.

The enclosed layout of the KWM-2 sub-chassis and relays K2 and K4 with the terminals and color code of attached wires will aid greatly when modifying or servicing the equipment.

Care should be taken in the cleaning and adjustment of the relays. It is recommended that a relay contact burnishing tool be used if it becomes necessary to clean the relay contacts. Do not use files or other abrasive implements as their use can score the contact surface and result in pitting.

It is suggested that this sheet be placed in the equipment instruction book for future reference.

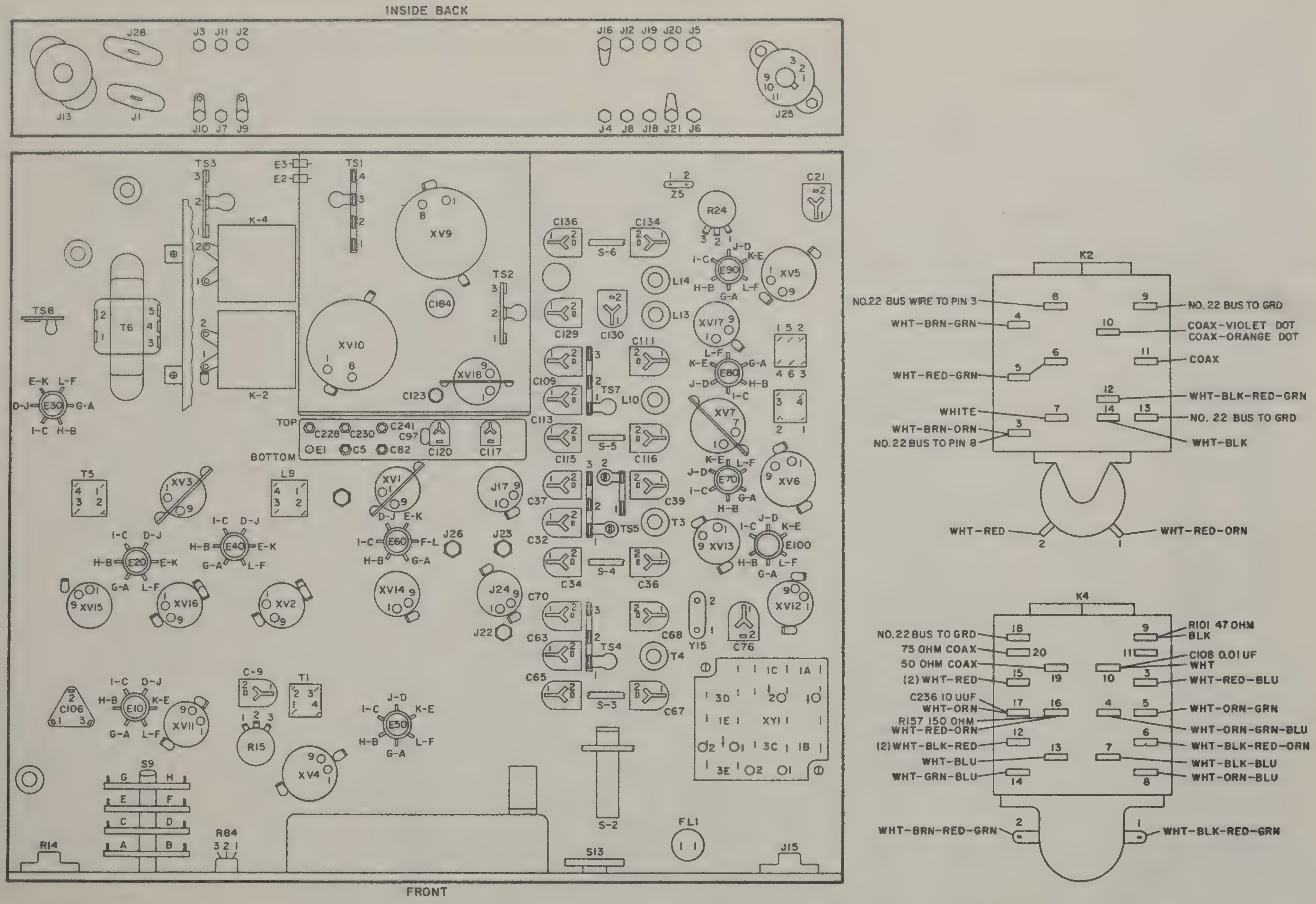

Figure 1. KWM-2 Chassis, Bottom View

COLLINS RADIO COMPANY
Field Service Department *Cedar Rapids, Iowa*
COLLINS
SERVICE BULLETIN

EQUIPMENT SERIES: KWM BULLETIN NO. 6 DATE: 1-11-62
Page 1 of 2

EQUIPMENT TYPE: TRANSCEIVERS KWM-2, KWM-2A

SUBJECT: TO ELIMINATE DELAY IN OPERATION WHEN SWITCHING FROM TRANSMIT TO RECEIVE FUNCTION

A few transceivers may exhibit indications of a delay in operation when switching from transmit to receive function. This delay of from 20 to 30 seconds may be caused by screen grid emission of the PA tubes. If so, it can be eliminated by changing PA tubes, or if a more permanent fix is desired, a 1N1490 diode can be installed as indicated below. Included below is a test that can be used to determine if this delay in operation is present, and is caused by screen grid emission of the 6146 PA tubes.

MODIFICATION PROCEDURE:

1. Remove cover of unit.
2. Connect a voltmeter from terminal 3 of tube socket XV9 to chassis ground. Set meter on 300-volt scale.
3. With power applied, turn EMISSION switch knob to LOCK KEY. Meter should read approximately 280 volts.
4. Turn EMISSION switch knob to USB so that unit is in receive function. Immediately upon switching, turn meter to 30-volt scale. If voltage is indicated and dies off slowly, there is screen grid emission on one or both 6146 tubes.
5. If screen grid emission is present, remove bus wire that is connected from terminal E3 (feedthrough terminal located near rear apron in PA grid box) to terminal 4 of terminal strip TS1. Install in its place a 1N1490 diode (353-1659-00) with anode connected to E3. Refer to figures 1 and 2.

CAUTION: Check that case of diode does not touch chassis or other ground.

PARTS REQUIRED:

Qty	Description	Collins Part Number	Price
1	Diode, 1N1490	353-1659-00	$3.28

The above part may be obtained from Collins Radio Company, Service Parts Department, Cedar Rapids, Iowa, at the price indicated, or it may be obtained from local radio parts distributors. If ordered from Collins Radio Company specify the Collins part number and make reference to KWM Service Bulletin No. 6.

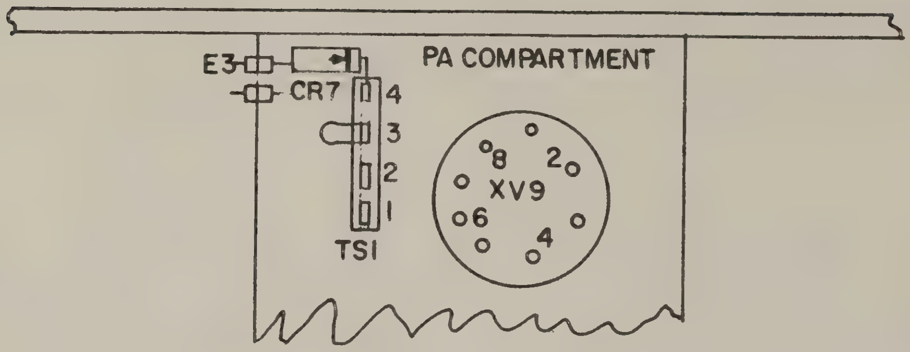

Figure 1. Location of Components Affected by this Modification.

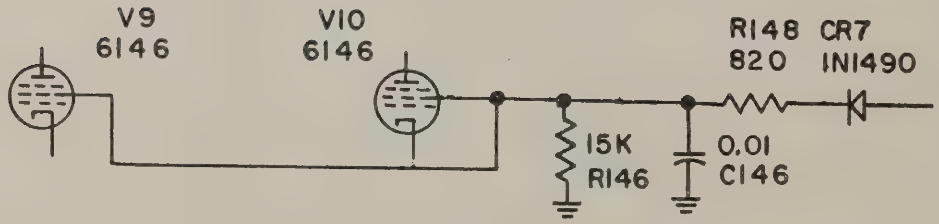

Figure 2. Partial Schematic Diagram Of PA Circuit Showing Addition Of 1N1490 Diode CR7.

COLLINS RADIO COMPANY
Field Service Department *Cedar Rapids, Iowa*

COLLINS SERVICE BULLETIN

EQUIPMENT SERIES: KWM BULLETIN NO. 5 DATE: 11-23-60
Page 1 of 4
(Revised 1-3-61)

EQUIPMENT TYPE: TRANSCEIVERS KWM-2, KWM-2A

SUBJECT: TO IMPROVE TRANSMIT-RECEIVE EXCITER TUNING COINCIDENCE

Better transmit-receive exciter tuning coincidence can be obtained by the modification described in this bulletin.

As the PA driver tube V8 is switched from transmit (conducting) to receive (nonconducting), tube capacitance changes approximately 4 uuf. This change is reflected in the plate circuit of r-f amplifier tube V7 and results in noncoincidence of transmit-receive exciter tuning on the high frequency bands.

Using the effect of capacitance change proportional to back bias voltage applied to a silicon capacitor, it is possible to add 4 uuf of capacitance to the plate circuit when the driver is in receive (nonconducting) function.

Before adding the capacitor make the following check to determine if unit was wired so that tube V8 conducts when operating in receive. Units wired in this manner must be modified according to section A before adding the silicon capacitor.

1. With transceiver turned off, raise top lid and remove PA shield cover.
2. Remove driver tube V8 and measure the resistance from pins 3 and 8 to pin 6 of tube socket XV8. If either resistance is approximately 22K ohms proceed with section A. If both resistances are quite high (above 60K ohms) proceed with section B.

To identify and locate components referred to in this service bulletin, refer to drawings supplied with Amateur Service Information Letter dated 11-15-60.

The modification and tuning procedure in this bulletin will permit peaking of the EXCITER TUNE for maximum PA grid current in transmit function and will not require repeaking for receive. This will not degrade receive operation.

MODIFICATION PROCEDURE:

Section A: Removal of B+ from the Screen Grid of Tube V8 and Application of Bias to Control Grid of V8, When in Receive Function.

1. Remove the four feet from bottom of transceiver.
2. Open lid and remove the two unpainted screws in the top front panel rim. Slide unit out of cabinet.

3. Turn unit bottom side up, with front panel toward operator.

4. Disconnect 22K-ohm 2-watt resistor R105 from junction of 100-ohm, 1/2-watt resistor R104 and 1000-uuf feedthrough capacitor C5 in PA grid compartment shield and reconnect to 1000-uuf feedthrough capacitor C82 in PA shield.

5. Remove bus wire located between tie points "D" and "G" on parts mounting turret E80.

6. From tie point "D" on this same parts mounting turret, transfer choke L11 to the adjacent clockwise tie point "E".

7. Proceed with Section B.

Section B: Installation of Silicon Capacitor

1. Connect new 10-uuf capacitor C272 (912-2753-00) from terminal "I" at the chassis end of parts mounting turret E80 to point "D" on the same mounting turret. Do not solder "D" connection.

2. Connect new 680K-ohm resistor R184 (745-0851-00) from tube socket XV17, pin 9 to tie point "D" on parts mounting turret E80. Do not solder "D" connection.

3. Observe polarity of silicon capacitor CR5 (922-6002-00). Connect anode (end marked with manufacturers' trade mark) to the ground shield of tube socket XV7. Connect cathode (color coded end) to tie point "D" on parts mounting turret E80. Do not solder "D" connection.

4. Connect new 1 meg-ohm resistor R183 (745-0857-00) from tie point "B" on parts mounting turret E70 to tie point "D" on parts mounting turret E80.

5. Solder connections to tie point "D".

6. Place chassis in upright position, and connect power cables and antenna load.

7. Check alignment in accordance with the following procedure. Some realignment of r-f trimmers, especially on the higher frequency bands, will be necessary. NOTE: This is not a standard alignment procedure. Refer to KWM-2 and KWM-2A Instruction Books for complete procedure.

   a. Set MIC GAIN control fully counterclockwise.

   b. Turn function switch to ON.

   c. Set main tuning dial to 100.

   d. Set EMISSION switch to TUNE.

COLLINS

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CEDAR RAPIDS, IOWA, U.S.A.

CABLE
COLINRAD

January 3, 1961

REVISION TO

KWM SERVICE BULLETIN NO. 5

Attached is a revision to KWM Service Bulletin No. 5, dated 11-23-60. The revision consists of changing the fourth paragraph on page 1 to allow for the fact that driver tube V8 has two screen grid terminals, pins 3 and 8. Thus transceivers wired so that V8 conducts while in receive function may show the 22K-ohm resistance between either pin 3 and pin 6 or pin 8 and pin 6, depending on which screen grid terminal is used.

Replace pages 1 and 2 of the referenced bulletin with the attached sheet.

e. Set EXCITER TUNE to 2.1 on the logging scale.

f. Set BAND switch to 3.6.

g. Set METER switch to PLATE position.

h. Turn PA TUNING control to white portion of dial, indicating the proper band.

i. Advance MIC GAIN to full clockwise position, and rock EXCITER TUNING control until maximum plate current is obtained.

j. Dip plate current immediately with the PA TUNING control.

k. Return MIC GAIN control to full counterclockwise position.

l. Set meter switch to GRID position.

m. Advance MIC GAIN control until some grid current indication is obtained.

n. Rock EXCITER TUNING control to a peak grid current indication.

NOTE: In the following steps reduce the setting of the MIC GAIN control as necessary to keep grid current below "S6".

o. Adjust trimmer capacitor marked 3.8 (C109 in r-f amplifier section) for peak grid current indication.

p. Repeat steps n and o until a peak indication is reached.

q. Return MIC GAIN to full counterclockwise position.

r. Repeat steps g through q for each of the remaining bands using the following table for selection of EXCITER TUNING, BAND switch position, and identification of r-f amplifier trimmer capacitance.

EXCITER TUNING LOGGING SCALE	BAND SWITCH	R-F AMPLIFIER STAGE	CAPACITOR
2.1	3.6	3.8	C109
3.5	7.0	7.0	C113
6.1	14.0	14.0	C115
7.6	21.2	21.0	C116
9.0	28A	28.0	C111

s. Turn off transceiver, remove cable, and return chassis to cabinet. Install the two screws in the front rim and replace feet.

PARTS REQUIRED: Modification Kit 547-1543-00 which consists of the following items: Price: $10.75

QTY	DESCRIPTION	COLLINS PART NUMBER
1	Capacitor, 10 uuf ±5%, 500 wvdc, fixed mica	912-2753-00
1	Resistor, 1 megohm ±10%, 1/4 watt, fixed composition	745-0857-00
1	Resistor, 680K-ohm ±10%, 1/4 watt, fixed composition	745-0851-00
1	Capacitor, Silicon 6-88 uuf, 130 wvdc	922-6002-00

The above parts may be obtained from Collins Radio Company, Service Parts Department, Cedar Rapids, Iowa, at the price indicated. All orders should specify modification kit 547-1543-00 and make reference to KWM-2,-2A Bulletin No. 5.

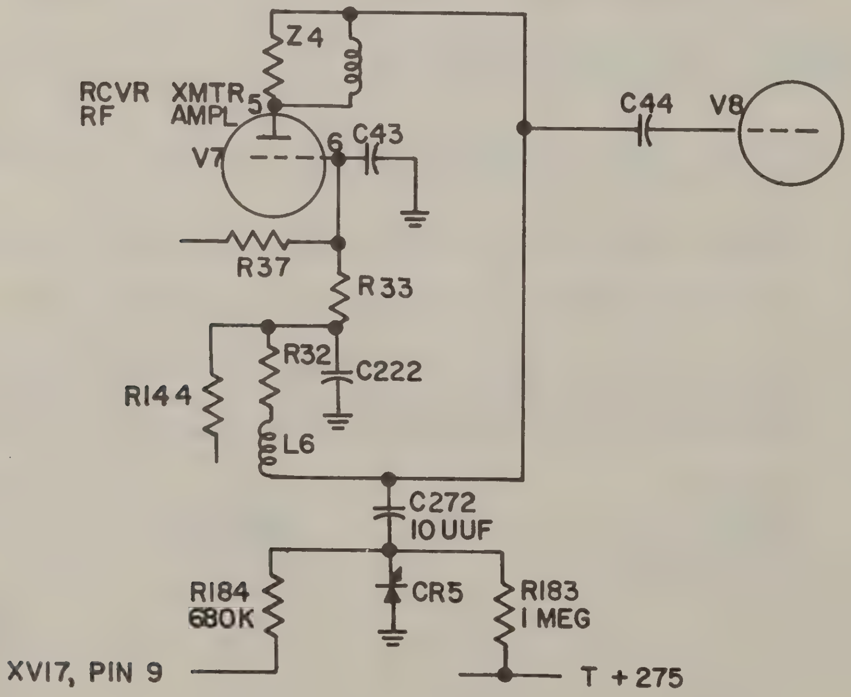


Figure 1. Schematic Diagram, After Modification

COLLINS RADIO COMPANY
Field Service Department *Cedar Rapids, Iowa*
COLLINS SERVICE BULLETIN

EQUIPMENT SERIES: KWM BULLETIN NO. 5 DATE: 11-23-60
Page 1 of 4

EQUIPMENT TYPE: TRANSCEIVERS KWM-2, KWM-2A

SUBJECT: TO IMPROVE TRANSMIT-RECEIVE EXCITER TUNING COINCIDENCE

Better transmit-receive exciter tuning coincidence can be obtained by the modification described in this bulletin.

As the PA driver tube V8 is switched from transmit (conducting) to receive (nonconducting), tube capacitance changes approximately 4 uuf. This change is reflected in the plate circuit of r-f amplifier tube V7 and results in noncoincidence of transmit-receive exciter tuning on the high frequency bands.

Using the effect of capacitance change proportional to back bias voltage applied to a silicon capacitor, it is possible to add 4 uuf of capacitance to the plate circuit when the driver is in receive (nonconducting) function.

Before adding the capacitor make the following check to determine if unit was wired so that tube V8 conducts when operating in receive. Units wired in this manner must be modified according to section A before adding the silicon capacitor.

1. With transceiver turned off, raise top lid and remove PA shield cover.
2. Remove driver tube V8 and measure the resistance between pins 6 and 8 of tube socket XV8. If resistance is approximately 22K ohms proceed with section A. If resistance is quite high (above 60K ohms) proceed with section B.

To identify and locate components referred to in this service bulletin, refer to drawings supplied with Amateur Service Information Letter dated 11-15-60.

The modification and tuning procedure in this bulletin will permit peaking of the EXCITER TUNE for maximum PA grid current in transmit function and will not require repeaking for receive. This will not degrade receive operation.

MODIFICATION PROCEDURE:

Section A: Removal of B+ from the Screen Grid of Tube V8 and Application of Bias to Control Grid of V8, When in Receive Function.

1. Remove the four feet from bottom of transceiver.
2. Open lid and remove the two unpainted screws in the top front panel rim. Slide unit out of cabinet.

3. Turn unit bottom side up, with front panel toward operator.

4. Disconnect 22K-ohm 2-watt resistor R105 from junction of 100-ohm, 1/2-watt resistor R104 and 1000-uuf feedthrough capacitor C5 in PA grid compartment shield and reconnect to 1000-uuf feedthrough capacitor C82 in PA shield.

5. Remove bus wire located between tie points "D" and "G" on parts mounting turret E80.

6. From tie point "D" on this same parts mounting turret, transfer choke L11 to the adjacent clockwise tie point "E".

7. Proceed with Section B.

Section B: Installation of Silicon Capacitor

1. Connect new 10-uuf capacitor C272 (912-2753-00) from terminal "I" at the chassis end of parts mounting turret E80 to point "D" on the same mounting turret. Do not solder "D" connection.

2. Connect new 680K-ohm resistor R184 (745-0851-00) from tube socket XV17, pin 9 to tie point "D" on parts mounting turret E80. Do not solder "D" connection.

3. Observe polarity of silicon capacitor CR5 (922-6002-00). Connect anode (end opposite color code) to the ground shield of tube socket XV7. Connect cathode (color coded end) to tie point "D" on parts mounting turret E80. Do not solder "D" connection.

4. Connect new 1 meg ohm resistor R183 (745-0857-00) from tie point "B" on parts mounting turret E70 to tie point "D" on parts mounting turret E80.

5. Solder connections to tie point "D".

6. Place chassis in upright position, and connect power cables and antenna load.

7. Check alignment in accordance with the following procedure. Some realignment of r-f trimmers, especially on the higher frequency bands, will be necessary. NOTE: This is not a standard alignment procedure. Refer to KWM-2 and KWM-2A Instruction Books for complete procedure.

   a. Set MIC GAIN control fully counterclockwise.

   b. Turn function switch to ON.

   c. Set main tuning dial to 100.

   d. Set EMISSION switch to TUNE.

COLLINS RADIO COMPANY
Field Service Department *Cedar Rapids, Iowa*

SERVICE BULLETIN

EQUIPMENT SERIES: KWM **BULLETIN NO. 4** **DATE 9-2-60**

Page 1 of 2

EQUIPMENT TYPE: KWM-2, KWM-2A

SUBJECT: IMPROVEMENT OF ALC ACTION AND ELIMINATION OF ALC OVERSHOOT.

Alc action can be improved and alc overshoot minimized by changing component values and circuitry relating to the alc rectifier and transmitter r-f amplifier. Alc overshoot, which occurs after the first oral syllable in some transceivers, is a result of the delay voltage on the alc rectifier and the relatively slow attack time of the alc voltage.

The following changes have been factory installed at different intervals; examine unit for changes before attempting modification.

MODIFICATION PROCEDURE:

1. Remove the four feet from bottom of transceiver.
2. Open lid, and remove the two unpainted screws in the top panel rim. Slide unit out of cabinet.
3. Turn unit bottom side up with front panel toward operator.
4. Check for a 1K-ohm, 1/2-watt resistor R10 and a 270K-ohm, 1/2-watt resistor R11 located on parts mounting turret between tube sockets XV7 and XV17. If present clip out and discard, and solder a piece of wire between tube socket XV17, pin 2 and the nearest ground point.
5. Clip out and discard 3.3-megohm, 1/2-watt resistor R119, and install in its place a 1.5-megohm 1/4-watt resistor (745-0863-00). This resistor is on parts mounting turret, located at the front center of the chassis adjacent to tube socket XV14.
6. Clip out and discard 3.3-megohm, 1/2-watt resistor R34, and install in its place a 100K-ohm, 1/4-watt resistor (745-0821-00). This resistor is on parts mounting turret located between tube sockets XV7 and XV13.
7. Place unit in upright position.
8. Remove the two black Phillips-head screws in the top corners of the PTO dial escutcheon.
9. Remove the cadmium-plated, sheet-metal screw in the top left side of the ALC ZERO potentiometer mounting bracket.
10. Lift out bracket.
11. Clip out and discard 220-ohm resistor R170 which is soldered across the terminals of ALC ZERO potentiometer R30.
12. Remount bracket.

CAUTION

Be sure 47-ohm resistor R19 on ALC ZERO potentiometer does not touch exciter tuning shaft.

13. Slide unit into cabinet, replace panel screws, and remount feet.
14. Connect power plug and antenna load.
15. Check grid drive and adjust if necessary. It may be low especially on the higher bands.
16. Alignment of the stage affected may be checked as follows:
    a. Set MIC GAIN control fully counterclockwise.

b. Turn FUNCTION switch to ON.

c. Set MAIN TUNING dial to 100.

d. Set EMISSION switch to TUNE.

e. Set EXCITER TUNING to 2.0 on logging scale.

f. Set BAND switch to 3.6.

g. Set METER switch to PLATE position.

h. Turn P. A. TUNING control to white portion of dial, indicating proper band.

i. Advance MIC GAIN to full clockwise position, and rock EXCITER TUNING until maximum plate current is obtained.

j. Dip plate current immediately with P. A. TUNING.

k. Return MIC GAIN to full counterclockwise position.

l. Set METER switch to GRID position.

m. Advance MIC GAIN until some grid-current indication is obtained.

n. Rock EXCITER TUNING to a peak grid-current indication.

NOTE

In the following steps reduce setting of MIC GAIN as necessary to keep grid current below "S6."

o. Adjust trimmer capacitor C37 marked "(A) 3.8" in mixer plate section for peak grid current indication.

p. Repeat steps n and o for peak grid-current indication.

q. Return MIC GAIN to full counterclockwise position.

r. Repeat steps g through q for each of the remaining bands: Use the following table for selection of EXCITER TUNING and BAND switch position and identification of mixer plate trimmer capacitors.

EXCITER TUNING	BAND SWITCH	ADJUST TRIMMER	MARKED
3.75	7.0	C32	(B) 7.0
6.50	14.2	C34	(C)14.0
7.60	21.2	C36	(D)21.0
9.00	28A	C39	(E)28.0

PARTS REQUIRED:

QTY	DESCRIPTION	COLLINS PART NUMBER	PRICE
1	Resistor, fixed composition, 1.5 megohm ±10%	745-0863-00	$.26
1	Resistor, fixed composition, 0.1 megohm ±10%	745-0821-00	$.26

The above parts are of common variety and should be available through local sources. If not, they may be obtained from Collins Radio Company, Service Parts Department, Cedar Rapids, Iowa at the prices indicated.

COLLINS RADIO COMPANY
Field Service Department *Cedar Rapids, Iowa*

COLLINS SERVICE BULLETIN

EQUIPMENT SERIES: **KWM** **BULLETIN NO.** **3** **DATE 7-12-60**
Page 1 of 1

EQUIPMENT TYPE: KWM-2

SUBJECT: CORRELATION BETWEEN FREQUENCIES ON DIFFERENT BANDS.

The correlation between frequencies on different bands of Transceiver KWM-2 can be improved by adding a 27-uuf capacitor to the grid circuit of the h-f oscillator tube V13. The addition of this capacitor will result in less need for PTO zero hairline adjustment when switching between bands.

This capacitor should be added to KWM-2 units only; do not add to KWM-2A units.

MODIFICATION PROCEDURE:

1. Remove the four feet from bottom.
2. Raise cover and remove the two unpainted screws from top of front panel rim. Slide chassis out.
3. Locate tube socket XV13 to the rear of crystal mounting board.
4. Turn chassis over and install 27-uuf capacitor (912-2775-00) between V13, pin 2 and the center shield of V13.
5. Slide chassis back in cabinet. Replace feet and two screws to the panel rim.

PARTS REQUIRED:

QTY	DESCRIPTION	COLLINS PART NUMBER	PRICE
1	Capacitor, fixed, silvered mica, 27 uuf ±10%, 500 wvdc	912-2775-00	$ 0.13

The above capacitor is of common variety and should be available from local sources. If not, it may be obtained from Collins Radio Company, Service Parts Department, Cedar Rapids, Iowa, at the price indicated.

* Original bulletin showed incorrect price of $9.25. Refunds will be made of monies received over this amount. Orders received but not yet shipped will be billed at the corrected price.

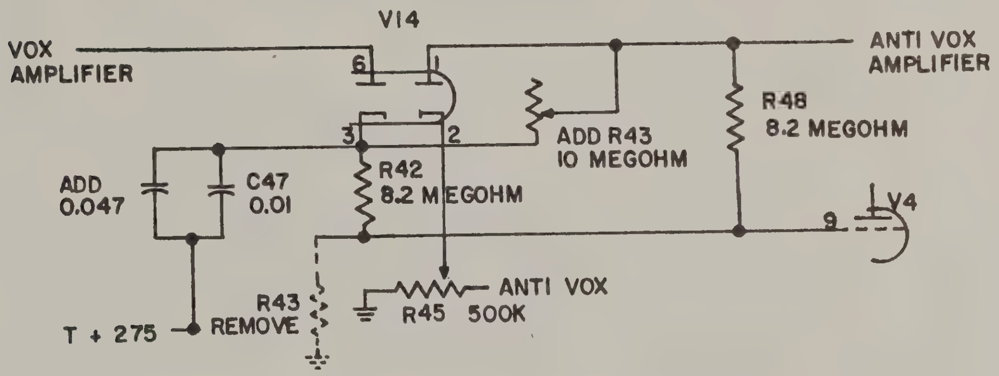


Figure 1. KWM-2/2A VOX Circuit Schematic Changes

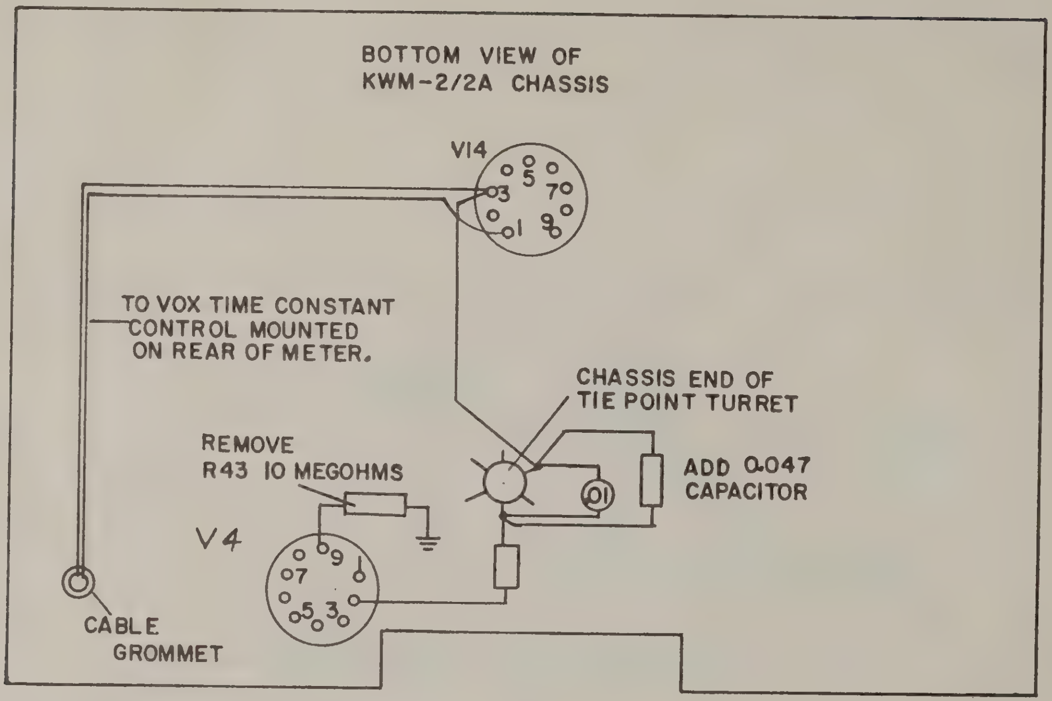


Figure 2. Parts Location - Under Chassis

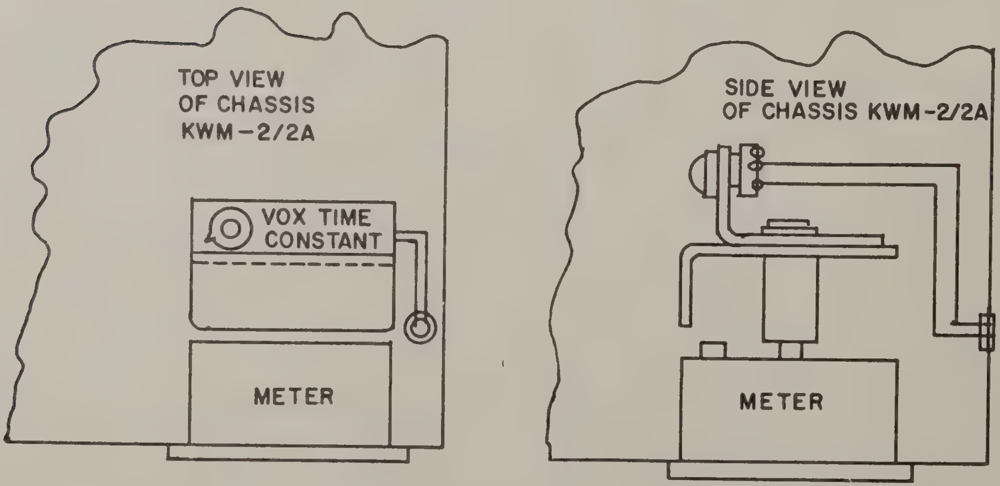


Figure 3. Installation of VOX Time Constant Control and Bracket

COLLINS RADIO COMPANY
Field Service Department *Cedar Rapids, Iowa*

COLLINS SERVICE BULLETIN

EQUIPMENT SERIES: KWM BULLETIN NO. 2 DATE 8-8-60
Page 1 of 4
(1st Revision 10-1-60)

EQUIPMENT TYPE: KWM-2, KWM-2A

SUBJECT: ADD VOX RELAY TIME CONSTANT CONTROL.

NOTE: This revision supersedes and replaces KWM Service Bulletin 2 dated 8-8-60. Changes are indicated by black lines in margin.

Modifying Transceiver KWM-2/2A according to this bulletin will allow the time constant of the vox-control relay to be adjusted. Adjusting the time constant will enable the operator to obtain a more uniform operation of the relay by compensating for variations in microphone and voice characteristics. Increasing the time constant will increase the time between the last spoken word or keyed character and the release of the relay; decreasing it will have converse effects.

MODIFICATION PROCEDURE:

See figure 1 for circuit changes.

1. Remove the feet from cabinet.

2. Lift lid and remove the two unpainted screws from the top rim of the front panel.

3. Slide unit out of cabinet.

4. Remove and discard the 10-megohm resistor R43 located between V4, pin 9 and ground.

5. Add 0.047-uf capacitor (931-0295-00) in parallel with 0.01-uf disc capacitor located between pins 1 and 3 of E50. E50 is a mounting turret post located between XV4 and XV14 tube sockets. Sleeve leads of new capacitors with insulation (152-1613-00). See figure 2.

6. Solder 18-inch length of wire (439-7036-00) to V14, pin 3 and another 18-inch length to V14, pin 1. Lay these wires along chassis and push through cable grommet (in corner near front panel) to the top of the chassis.

7. With transceiver in upright position, remove the two nuts holding the shield to the back of the meter.

8. Mount VOX TIME CONSTANT control bracket (546-7971-00) on the meter shield using hardware removed in step 7. See figure 3.

9. Solder either one of the 18-inch wires to the center terminal of the control.

10. Solder the other wire to the counterclockwise terminal (as viewed from the shaft end) of the control. Refer to figure 3.

11. Mount VOX TIME CONSTANT control (376-7206-00) in the new bracket, using hardware and knob included in kit.

12. Reassemble unit.

ADJUSTMENT PROCEDURE:

1. To set controls, place the VOX TIME CONSTANT control to midrange and the VOX and ANTI-VOX controls fully counterclockwise.

2. Speak into microphone and advance the VOX GAIN until satisfactory vox action is attained.

3. Continuing to speak into the microphone, rotate the VOX TIME CONSTANT control clockwise to increase delay and counterclockwise to shorten delay time. As the control is rotated counterclockwise to reduce the release time, vox sensitivity will be reduced. It may be necessary to advance the VOX GAIN control.

4. Set the ANTI-VOX control as outlined in the instruction book.

PARTS REQUIRED:

Modification Kit 546-7969-00 which consists of: * Price $3.50

QTY	DESCRIPTION	COLLINS PART NUMBER
1	Bracket mounting, resistor	546-7971-002
1	Nut, lock hex 3/8-32	313-0061-00
1	Washer, 3/8	373-0085-00
1	Resistor, variable - 10 meg	376-7206-00
1	Knob, black phenolic	281-0069-00
1	Capacitor, 0.047 uuf ±10%, Fixed paper dielectric	931-0295-00
3 (ft)	Wire, no. 22 Electrical, white-green	439-7036-00
0.3 (ft)	Insulation Sleeving, electrical	152-1613-00

The above kit may be obtained from Collins Radio Company, Service Parts Department, Cedar Rapids, Iowa, at the price indicated. All orders should specify modification kit 546-7969-00 and make reference to KWM Bulletin No. 2.

COLLINS RADIO COMPANY
CEDAR RAPIDS, IOWA

FIELD SERVICE

AMATEUR SERVICE INFORMATION LETTER

DATE: 11-15-60
Page 1 of 2

EQUIPMENT TYPE: KWM-2

SUBJECT: SERVICING INFORMATION

From time to time Field Service Bulletins are published which require location and identification of components and terminal arrangement in Transceiver KWM-2.

The enclosed layout of the KWM-2 sub-chassis and relays K2 and K4 with the terminals and color code of attached wires will aid greatly when modifying or servicing the equipment.

Care should be taken in the cleaning and adjustment of the relays. It is recommended that a relay contact burnishing tool be used if it becomes necessary to clean the relay contacts. Do not use files or other abrasive implements as their use can score the contact surface and result in pitting.

It is suggested that this sheet be placed in the equipment instruction book for future reference.

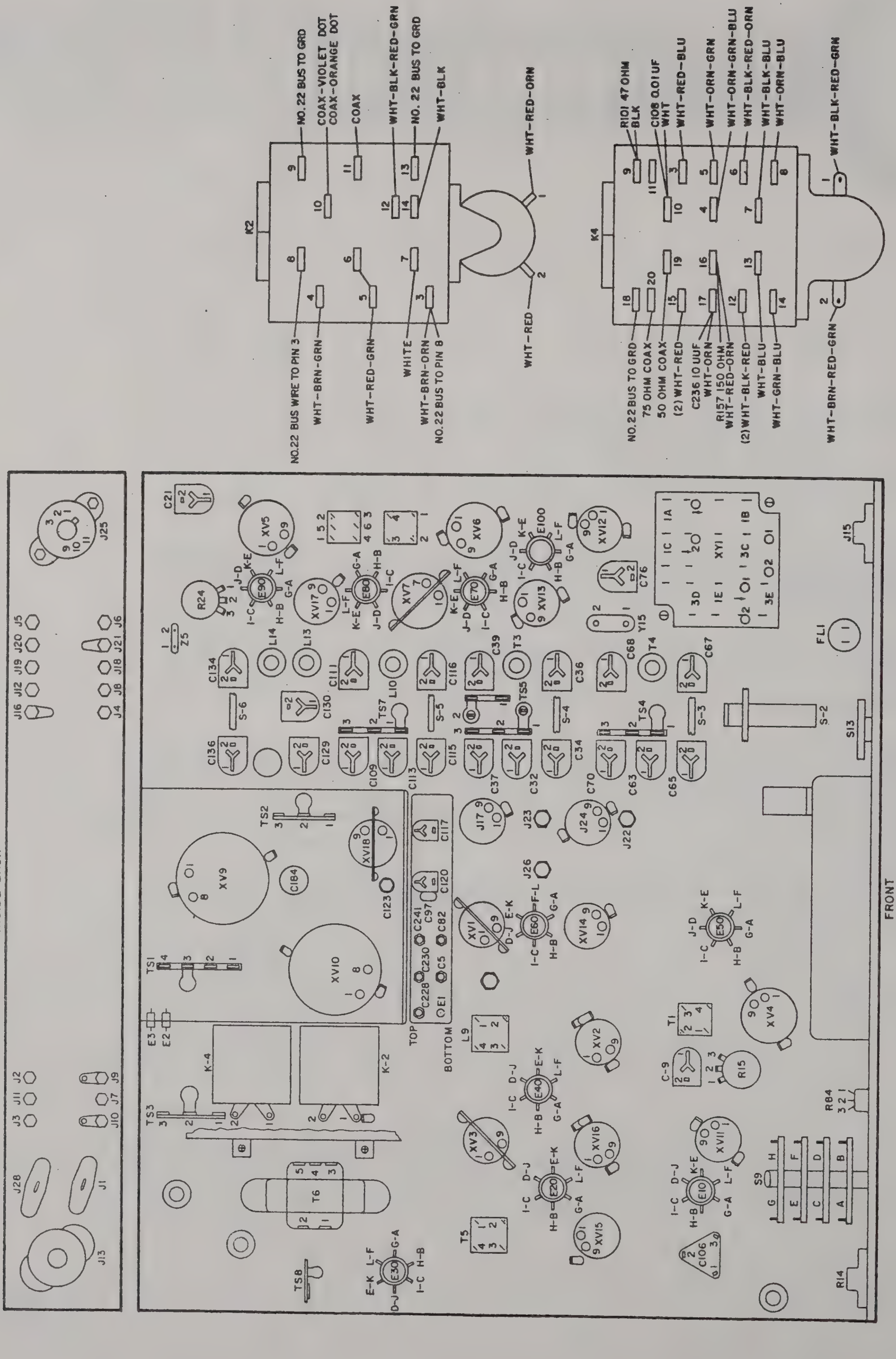


Figure 1. KWM-2 Chassis, Bottom View

ADDENDUM TO KWM-2 INSTRUCTION BOOK

2nd Edition

1. Page 5. Table 2-1. For bandswitch position 15-20A, Crystal Supplied frequency, change to 15.8275 mc.

2. Page 19. Add at end of Section IV.

4.6 DIAL CORD REPLACEMENT. Refer to figure 4-2.

4.6.1 BANDSWITCH CORD.

a. Place BAND switch in position 2A. Remove all power from KWM-2 and remove the PA compartment top cover. Short the PA plates to ground with a screwdriver blade. Check to see that the movable contacts of both S7 and S8 are at position 13 and 14. This may be determined by counting clockwise on the wafer from the X-mark, looking at the wafer on the side marked with the X, and beginning with the first position clockwise from the X-mark as 1. Count all positions, including the holes in the empty spaces where there are no lugs mounted.

b. Use a knife blade or small screwdriver and pry the tab open far enough to release the old cord. This tab is located on the inner face of the pulley. Remove the broken or defective cord from the bandswitch pulleys near the front panel. One is located above the chassis and the other below the chassis. Loosen the idler pulley so it will not be in the way during restringing.

c. Replace the old cord with three feet of new cord from Collins part number 432 1009 00. When ordering dial cord, be sure to state the desired length in feet.

d. String the cord according to the appropriate part of figure 4-2. Make sure the cord turns do not overlap on the pulleys. Pull the cord tight and tie to the tab. Mash the tab down to clamp the cord securely. Tighten the idler to bring the cord to tension.

e. Check again that the switch sections S7 and S8 are properly positioned according to the instructions of step a above. If they are not, loosen the shaft coupler and turn the switch shaft to bring the contacts to proper position. Tighten the shaft coupler.

f. Dab a little airplane cement on the dial cord knots to help keep them tight. After the cement is dry, trim the loose ends back NO CLOSER than 1/2 inch from the knots.

4.6.2 LOADING CAPACITOR CORD.

a. Place INCR LOAD control at 10 on the logging scale. This positions the INCR LOAD control horizontally and points it at the meter. Remove all power from the KWM-2 and remove the PA compartment top cover. Short the PA

plate caps to ground with a screwdriver blade. Check that the loading capacitor is fully meshed. If not, position the capacitor plates manually so they are fully meshed.

b. Use a knife or small screwdriver and pry the tab open far enough to release the old cord. Remove the broken or defective dial cord from the loading capacitor pulleys.

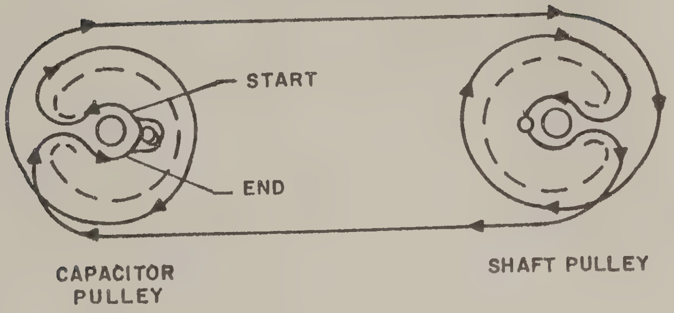
c. Replace the old cord with two feet of new cord from Collins part number 432 1009 00. When ordering dial cord, be sure to state the desired length in feet.

d. String the cord according to the appropriate part of figure 5-2. Make sure the cord turns do not overlap on the pulleys. Pull the cord tight and tie to the tab. Mash the tab down to clamp the cord securely.

e. Check to see that the INCR LOAD control is at 10 on the logging scale, and that the loading capacitor is fully meshed. If not, loosen the shaft coupler, mesh the capacitor plates manually, and tighten the coupler.

f. Dab a little airplane cement on the knots in the dial cords to help hold them tight. After the cement is dry, trim the loose ends back NO CLOSER than 1/2 inch from the knots.

LOADING CAPACITOR CORD



BANDSWITCH CORD

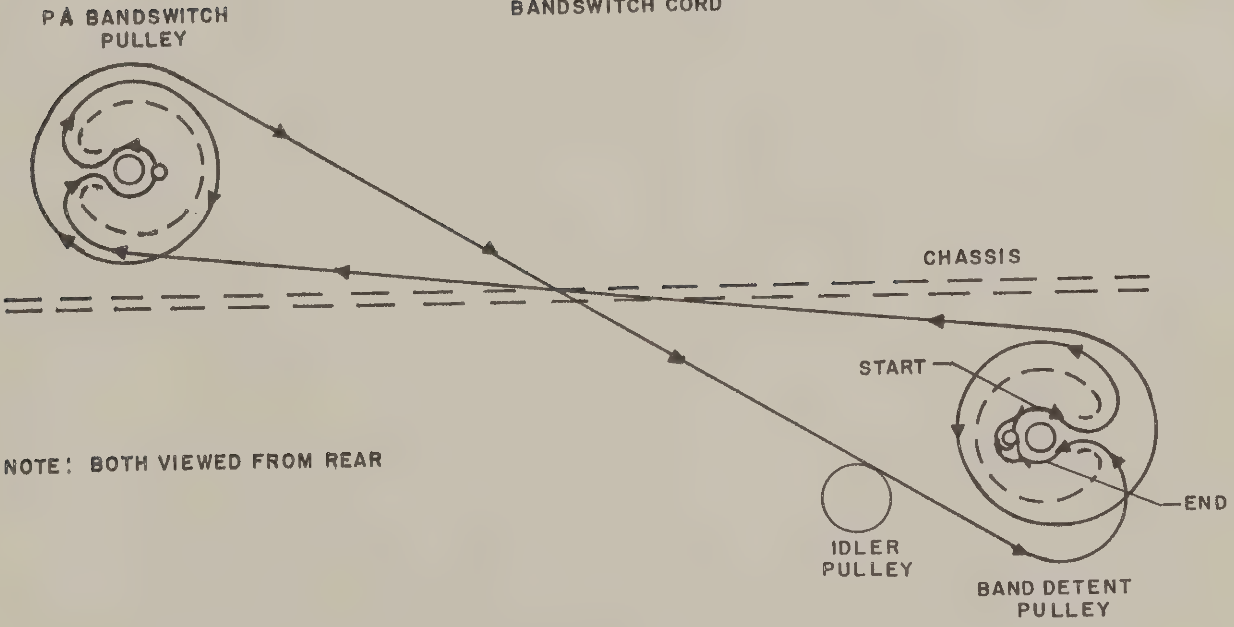


FIGURE 4-2 DIAL CORD STRINGING DIAGRAM

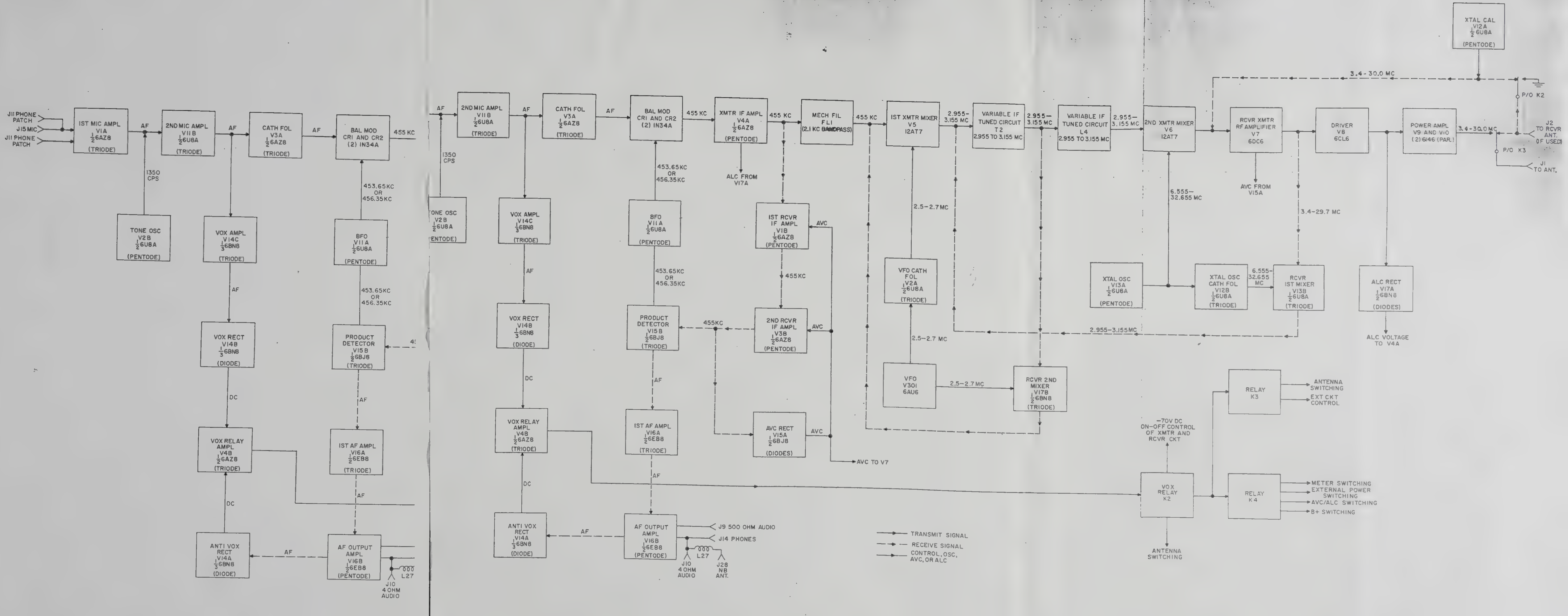
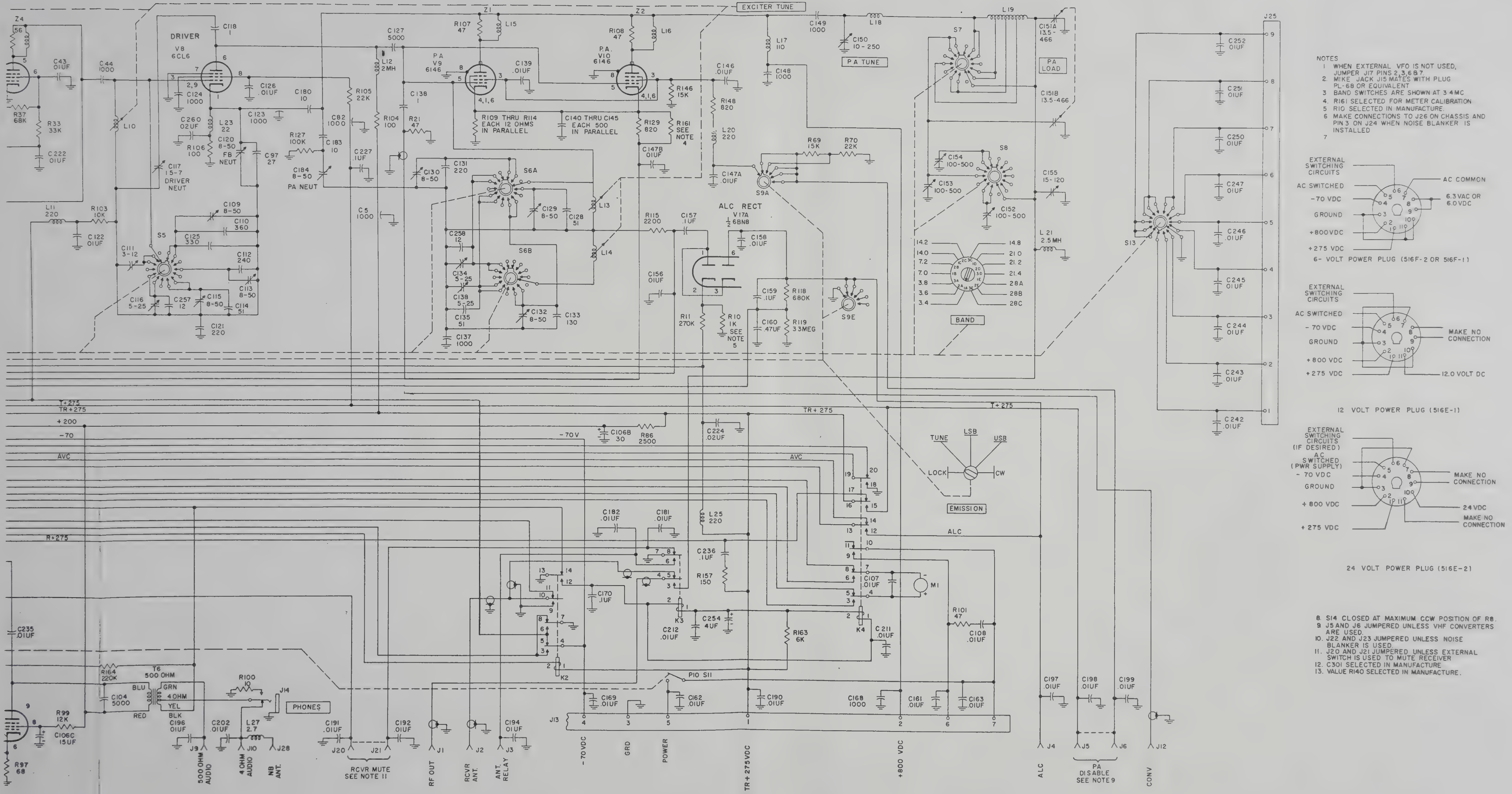

J11 PHONE PATCH
J15 MIC
J11 PHONE PATCH
IST MIC AMPL V1A ½6AZ8 (TRIODE)
AF
1350 CPS
TONE OSC V2B ½6U8A (PENTODE)
2ND MIC AMPL V11B ½6U8A (TRIODE)
VOX AMPL V14C ⅓6BN8 (TRIODE)
VOX RECT V14B ⅓6BN8 (DIODE)
DC
VOX RELAY AMPL V4B ½6AZ8 (TRIODE)
ANTI VOX RECT V14A ⅓6BN8 (DIODE)
CATH FOL V3A ½6AZ8 (TRIODE)
BAL MOD CR1 AND CR2 (2) 1N34A
455 KC
453.65KC OR 456.35KC
BFO V11A ½6U8A (PENTODE)
PRODUCT DETECTOR V15B ½6BJ8 (TRIODE)
IST AF AMPL V16A ½6EB8 (TRIODE)
AF OUTPUT AMPL V16B ½6EB8 (PENTODE)
J9 500 OHM AUDIO
J14 PHONES
J10 4 OHM AUDIO
L27
J28 NB ANT.
XMTR IF AMPL V4A ½6AZ8 (PENTODE)
ALC FROM V17A
MECH FIL FL1 (2.1 KC BANDPASS)
IST RCVR IF AMPL V1B ½6AZ8 (PENTODE)
AVC
455KC
2ND RCVR IF AMPL V3B ½6AZ8 (PENTODE)
AVC RECT V15A ½6BJ8 (DIODES)
AVC TO V7
IST XMTR MIXER V5 12AT7
2.955–3.155 MC
2.5–2.7 MC
VFO CATH FOL V2A ½6U8A (TRIODE)
VFO V301 6AU6
VARIABLE IF TUNED CIRCUIT T2 2.955 TO 3.155 MC
VARIABLE IF TUNED CIRCUIT L4 2.955 TO 3.155 MC
RCVR 2ND MIXER V17B ½6BN8 (TRIODE)
2ND XMTR MIXER V6 12AT7
6.555–32.655 MC
XTAL OSC V13A ½6U8A (PENTODE)
XTAL OSC CATH FOL V12B ½6U8A (TRIODE)
RCVR IST MIXER V13B ½6U8A (TRIODE)
XTAL CAL V12A ½6U8A (PENTODE)
3.4–30.0 MC
RCVR XMTR RF AMPLIFIER V7 6DC6
AVC FROM V15A
3.4–29.7 MC
DRIVER V8 6CL6
POWER AMPL V9 AND V10 (2) 6146 (PAR.)
ALC RECT V17A ½6BN8 (DIODES)
ALC VOLTAGE TO V4A
P/O K2
P/O K3
J2 TO RCVR ANT. (IF USED)
J1 TO ANT.
RELAY K3
ANTENNA SWITCHING
EXT CKT CONTROL
–70V DC ON-OFF CONTROL OF XMTR AND RCVR CKT
VOX RELAY K2
ANTENNA SWITCHING
RELAY K4
METER SWITCHING
EXTERNAL POWER SWITCHING
AVC/ALC SWITCHING
B+ SWITCHING
TRANSMIT SIGNAL
RECEIVE SIGNAL
CONTROL, OSC, AVC, OR ALC

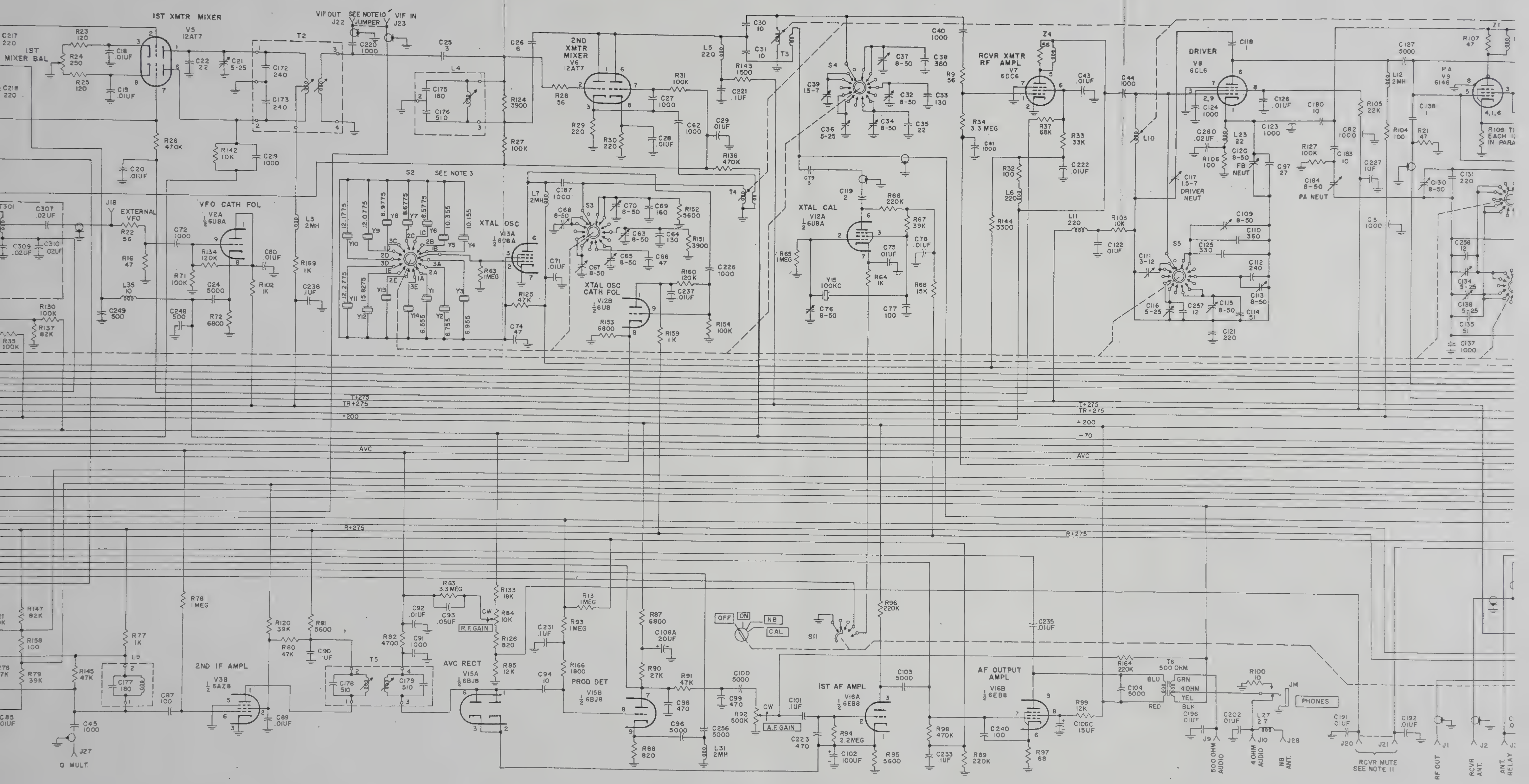
Figure 3-1. KWM-2 Transceiver, Block Diagram

SECTION VII
ILLUSTRATIONS

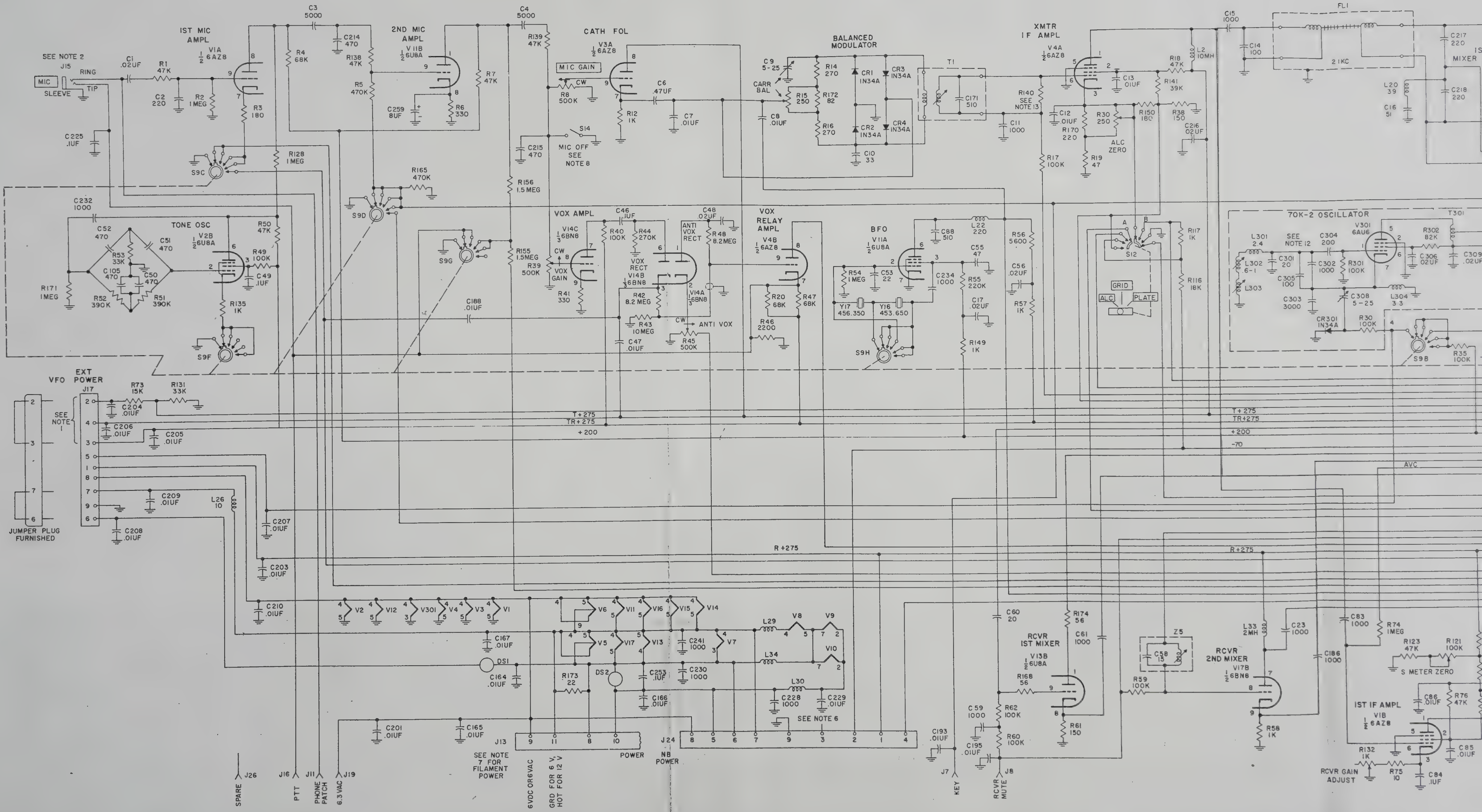


NOTES
1 WHEN EXTERNAL VFO IS NOT USED, JUMPER J17 PINS 2, 3, 6 & 7.
2. MIKE JACK J15 MATES WITH PLUG PL-68 OR EQUIVALENT
3 BAND SWITCHES ARE SHOWN AT 3.4 MC
4. R161 SELECTED FOR METER CALIBRATION
5 R10 SELECTED IN MANUFACTURE.
6 MAKE CONNECTIONS TO J26 ON CHASSIS AND PIN 3 ON J24 WHEN NOISE BLANKER IS INSTALLED
7
8. S14 CLOSED AT MAXIMUM CCW POSITION OF R8.
9. J5 AND J6 JUMPERED UNLESS VHF CONVERTERS ARE USED.
10. J22 AND J23 JUMPERED UNLESS NOISE BLANKER IS USED.
11. J20 AND J21 JUMPERED UNLESS EXTERNAL SWITCH IS USED TO MUTE RECEIVER
12. C301 SELECTED IN MANUFACTURE
13. VALUE R140 SELECTED IN MANUFACTURE.

Figure 7-1. KWM-2 Transceiver, Schematic Diagram



1ST XMTR MIXER
V5 12AT7
1ST MIXER BAL
C217 220
C218 220
R23 120
R24 250
R25 120
C18 .01UF
C19 .01UF
R26 470K
C20 .01UF
C21 5-25
C22 22
T2
C172 240
C173 240
R142 10K
C219 1000
VIF OUT J22
SEE NOTE 10
JUMPER
VIF IN J23
C220 1000
C25 3
L4
C175 180
C176 510
C26 6
R124 3900
R27 100K
2ND XMTR MIXER
V6 12AT7
R28 56
R29 220
R30 220
C27 1000
C28 .01UF
R31 100K
C62 1000
C29 .01UF
R136 470K
L5 220
C30 10
C31 10
T3
R143 1500
C221 .1UF
T4
S4
C37 8-50
C38 360
C39 1.5-7
C32 8-50
C33 130
C36 5-25
C34 8-50
C35 22
C40 1000
R9 56
R34 3.3 MEG
C41 1000
RCVR XMTR RF AMPL
V7 6DC6
Z4
56
C43 .01UF
R37 68K
R33 33K
C222 .01UF
R32 100
L6 220
R144 3300
L11 220
R103 10K
C122 .01UF
C44 1000
L10
DRIVER
V8 6CL6
C118 1
C124 1000
C126 .01UF
C260 .02UF
L23 22
R106 100
C120 8-50
FB NEUT
C97 27
C123 1000
C117 1.5-7
DRIVER NEUT
C109 8-50
C110 360
C125 330
S5
C111 3-12
C112 240
C113 8-50
C116 5-25
C257 12
C115 8-50
C114 51
C121 220
C180 10
C82 1000
R105 22K
R127 100K
C183 10
C184 8-50
PA NEUT
C127 5000
L12 2MH
R104 100
C227 .1UF
C5 1000
R107 47
Z1
PA V9 6146
C138 1
R21 47
R109
EACH
IN PARA
C130 8-50
C131 220
C258 12
C134 5-25
C138 5-25
C135 51
C137 1000
S2
SEE NOTE 3
12.1775
12.0775
8.9775
8.6775
8.5775
10.355
10.155
Y10 Y9 Y8 Y7 Y6 Y5 Y4
12.2775
15.8275
Y11 Y12 Y13 Y14 Y1 Y2 Y3
6.555
6.755
6.955
XTAL OSC
V13A ½6U8A
R63 1MEG
R125 47K
C74 47
L7 2MH
C187 1000
C68 8-50
S3
C70 8-50
C69 160
R152 5600
C63 8-50
C64 130
R151 3900
C71 .01UF
C67 8-50
C65 8-50
C66 47
C226 1000
XTAL OSC CATH FOL
V12B ½6U8
R153 6800
R160 120K
C237 .01UF
R159 1K
R154 100K
C79 3
C119 2
XTAL CAL
V12A ½6U8A
R66 220K
R67 39K
C78 .01UF
R65 1MEG
C75 .01UF
R64 1K
R68 15K
Y15 100KC
C76 8-50
C77 100
T301
C307 .02UF
C309 .02UF
C310 .02UF
J18
EXTERNAL VFO
R22 56
R16 47
VFO CATH FOL
V2A ½6U8A
C72 1000
R134 120K
C80 .01UF
R71 100K
C24 5000
R102 1K
L35 10
C249 500
C248 500
R72 6800
L3 2MH
R169 1K
C238 .1UF
R130 100K
R137 82K
R35 100K
T+275
TR+275
+200
AVC
R+275
+200
-70
R147 82K
R158 100
R79 39K
R145 47K
C45 1000
C85 .01UF
J27
Q MULT
R77 1K
L9
C177 180
C87 100
R78 1MEG
R120 39K
R80 47K
R81 5600
C90 .1UF
2ND IF AMPL
V3B ½6AZ8
C89 .01UF
T5
C178 510
C179 510
R83 3.3 MEG
C92 .01UF
C93 .05UF
R82 4700
C91 1000
R133 18K
CW
R84 10K
R.F. GAIN
R126 820
R85 12K
AVC RECT
V15A ½6BJ8
C94 10
C231 .1UF
R13 1MEG
R93 1MEG
R166 1800
PROD DET
V15B ½6BJ8
R87 6800
C106A 20UF
R90 27K
R91 47K
C98 470
C96 5000
R88 820
C256 5000
L31 2MH
OFF ON NB CAL
S11
C100 5000
C99 470
R92 500K
CW
A.F. GAIN
C101 .1UF
C223 470
R94 2.2MEG
C102 100UF
1ST AF AMPL
V16A ½6EB8
R96 220K
R95 5600
C103 5000
R98 470K
C233 .1UF
R89 220K
C235 .01UF
AF OUTPUT AMPL
V16B ½6EB8
C240 100
R97 68
R99 12K
C106C 15UF
R164 220K
T6 500 OHM
C104 5000
BLU GRN 4 OHM YEL
RED BLK
C196 .01UF
J9
500 OHM AUDIO
C202 .01UF
L27 2.7
J10
4 OHM AUDIO
J28
NB ANT.
R100 10
J14
PHONES
C191 .01UF
J20 J21
RCVR MUTE SEE NOTE 11
C192 .01UF
J1 RF OUT
J2 RCVR ANT.
ANT. RELAY



SEE NOTE 2
J15
RING
TIP
SLEEVE
MIC
C1 .02UF
R1 47K
C2 220
R2 1MEG
IST MIC AMPL
V1A ½ 6AZ8
R3 180
C225 .1UF
S9C
C3 5000
R4 68K
C214 470
R138 47K
R5 470K
2ND MIC AMPL
V11B ½ 6U8A
C259 8UF
R6 330
R7 47K
R128 1MEG
C4 5000
R139 47K
CATH FOL
V3A ½ 6AZ8
MIC GAIN
CW
R8 500K
R12 1K
C6 .47UF
C7 .01UF
S14
MIC OFF SEE NOTE 8
C215 470
R165 470K
S9D
R156 1.5 MEG
BALANCED MODULATOR
C9 5-25
CARR BAL
R15 250
C8 .01UF
R14 270
R172 82
R16 270
CR1 1N34A
CR2 1N34A
CR3 1N34A
CR4 1N34A
C10 33
T1
C171 510
XMTR IF AMPL
V4A ½ 6AZ8
R140 SEE NOTE 13
C11 1000
C12 .01UF
R170 220
R30 250
ALC ZERO
R19 47
R17 100K
C13 .01UF
R18 47K
R141 39K
R150 180
R38 150
C216 .02UF
L2 10MH
C15 1000
C14 100
FL1
2 1KC
C217 220
C218 220
L20 39
C16 51
MIXER
C232 1000
TONE OSC
V2B ½ 6U8A
C52 470
C51 470
R53 33K
C105 470
C50 470
R52 390K
R51 390K
R171 1MEG
R50 47K
R49 100K
C49 .1UF
R135 1K
S9F
S9G
R155 1.5MEG
R39 500K
VOX GAIN
CW
VOX AMPL
V14C ⅓ 6BN8
R41 330
C46 .1UF
R40 100K
R44 270K
VOX RECT
V14B ⅓ 6BN8
R42 8.2 MEG
R43 10MEG
C47 .01UF
ANTI VOX RECT
C48 .02UF
R48 8.2MEG
V14A ⅓ 6BN8
ANTI VOX
R45 500K
C188 .01UF
VOX RELAY AMPL
V4B ½ 6AZ8
R20 68K
R47 68K
R46 2200
BFO
V11A ½ 6U8A
R54 1MEG
C53 22
C88 510
L22 220
C234 1000
C55 47
R55 220K
Y17 456.350
Y16 453.650
S9H
C17 .02UF
R149 1K
R56 5600
C56 .02UF
R57 1K
S12
A
B
R117 1K
R116 18K
GRID
ALC
PLATE
70K-2 OSCILLATOR
V301 6AU6
T301
L301 2.4
SEE NOTE 12
C304 200
L302 6-1
C301 20
C302 1000
R301 100K
C305 100
L303
C303 3000
C308 5-25
L304 3.3
R302 82K
C306 .02UF
C309 .02UF
CR301 1N34A
R30 100K
S9B
R35 100K
VFO
EXT POWER
J17
SEE NOTE 1
R73 15K
R131 33K
C204 .01UF
C206 .01UF
C205 .01UF
C209 .01UF
L26 10
C207 .01UF
C208 .01UF
JUMPER PLUG FURNISHED
C203 .01UF
C210 .01UF
T+275
TR+275
+200
-70
AVC
R+275
V2
V12
V301
V4
V3
V1
V6
V11
V16
V15
V14
V5
V17
V13
V7
V8
V9
V10
L29
L34
L30
C167 .01UF
DS1
C164 .01UF
R173 22
DS2
C253 .1UF
C241 1000
C230 1000
C166 .01UF
C228 1000
C229 .01UF
SEE NOTE 6
C201 .01UF
C165 .01UF
J13
SEE NOTE 7 FOR FILAMENT POWER
POWER
J24
NB POWER
J26
SPARE
J16
PTT
J11
PHONE PATCH
J19
6.3 VAC
6VDC OR 6VAC
GRD FOR 6 V; HOT FOR 12 V
C60 20
C59 1000
C193 .01UF
C195 .01UF
R62 100K
R60 100K
J7
KEY
J8
RCVR MUTE
RCVR 1ST MIXER
V13B ½ 6U8A
R168 56
R174 56
C61 1000
R61 150
Z5
C58 15
R59 100K
RCVR 2ND MIXER
V17B ⅓ 6BN8
R58 1K
L33 2MH
C23 1000
C186 1000
C83 1000
R74 1MEG
R123 47K
R121 100K
S METER ZERO
1ST IF AMPL
V1B ½ 6AZ8
C86 .01UF
R76 47K
R132 1K
R75 10
C84 .1UF
C85 .01UF
RCVR GAIN ADJUST

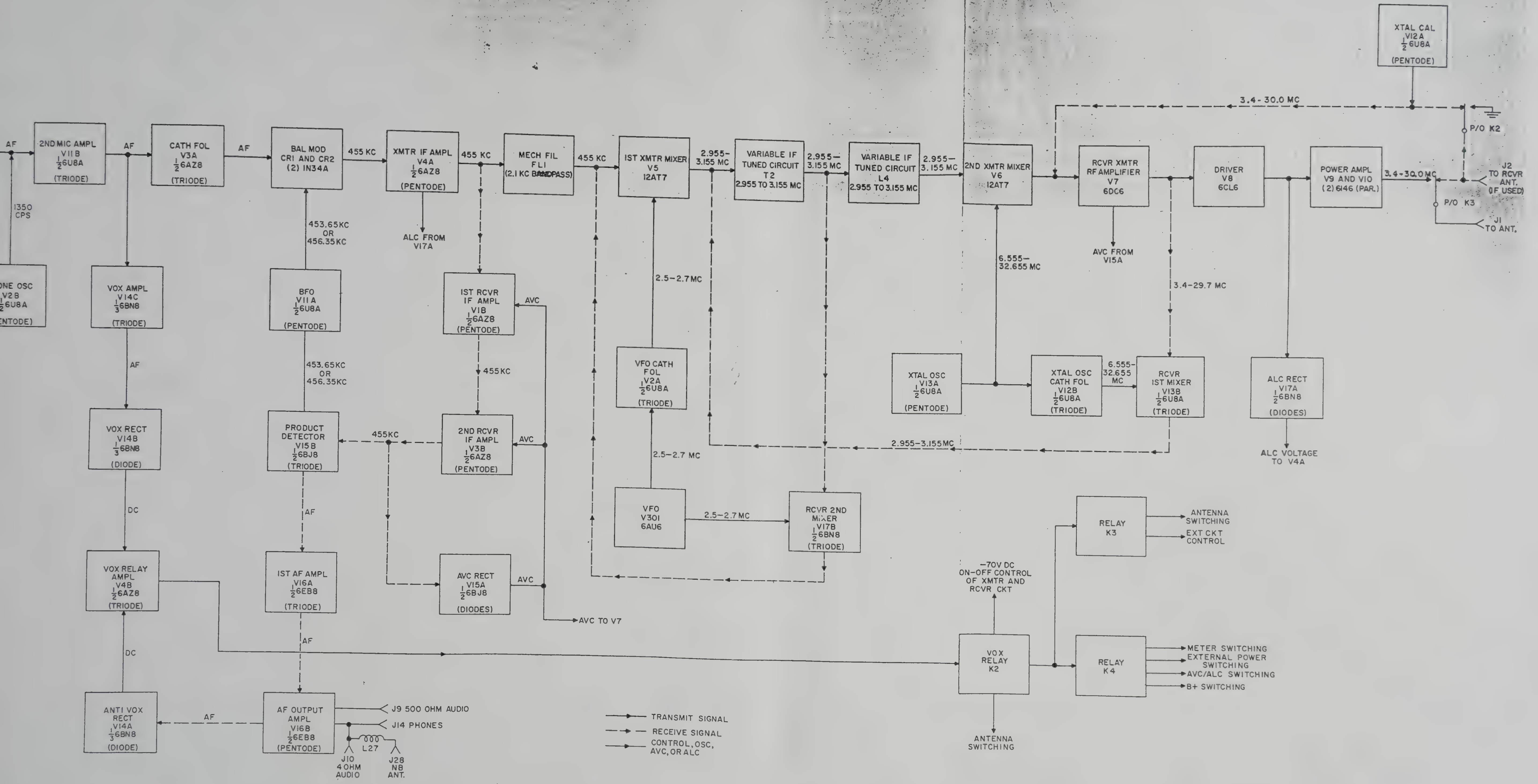
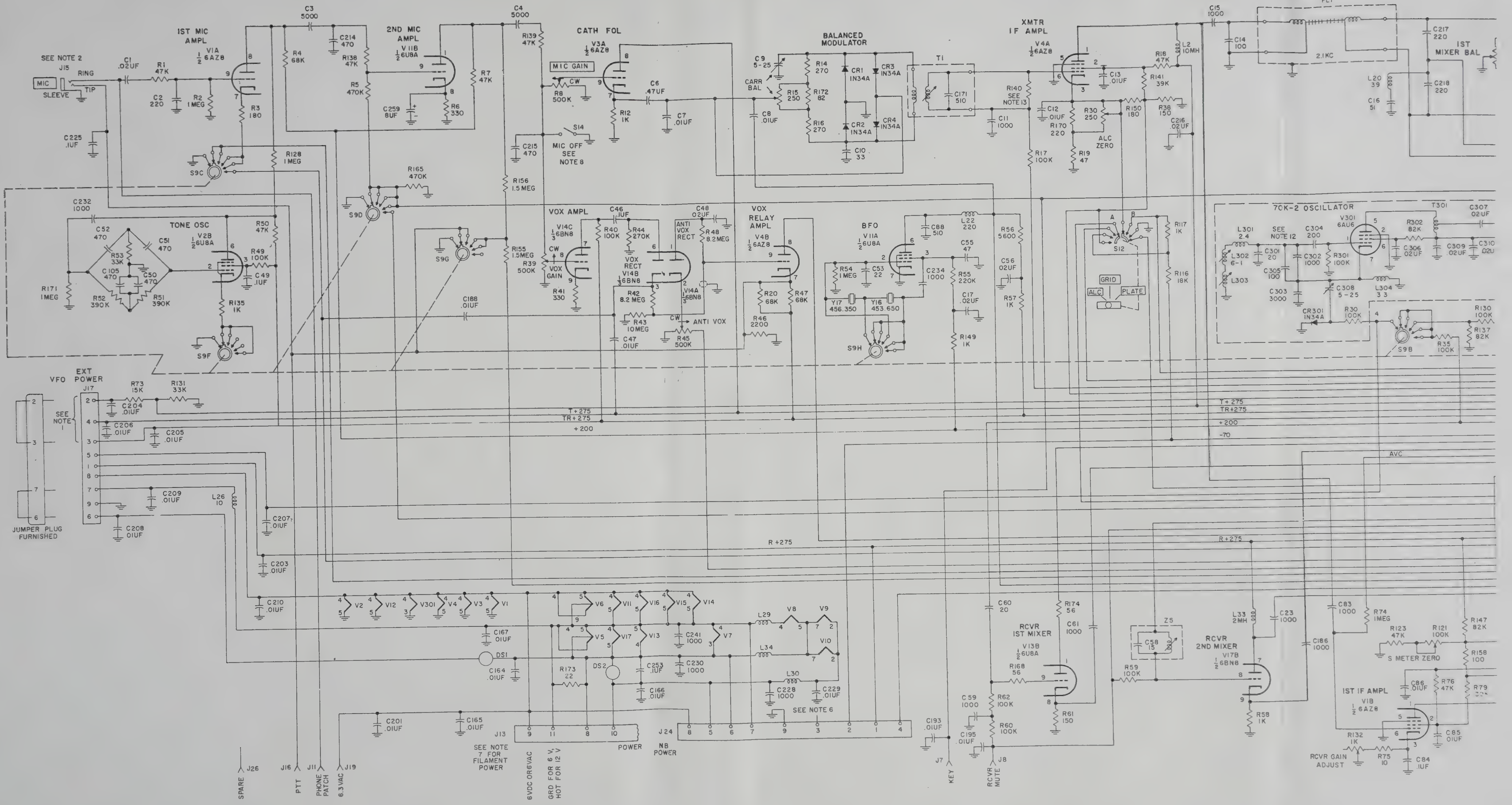
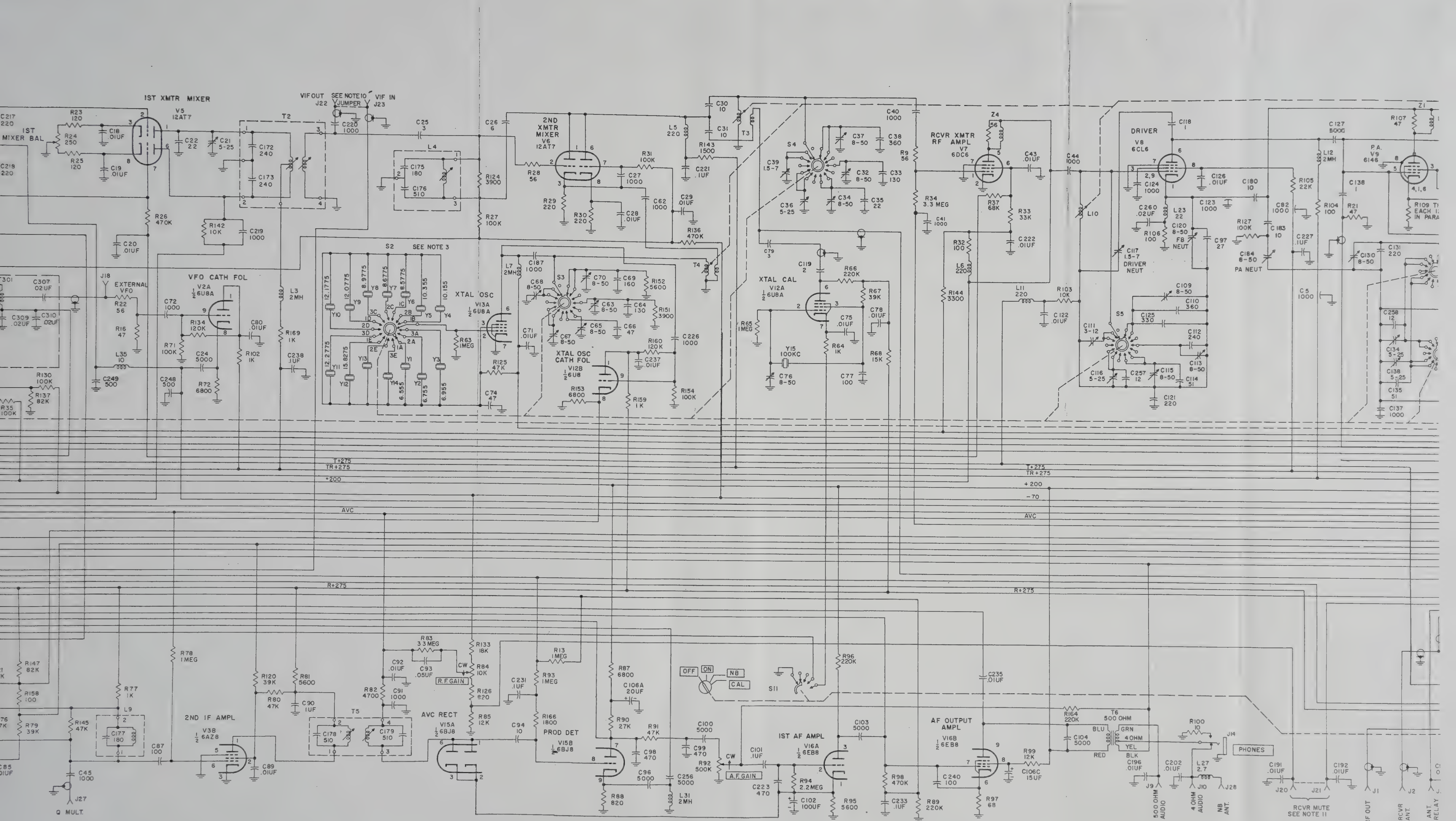
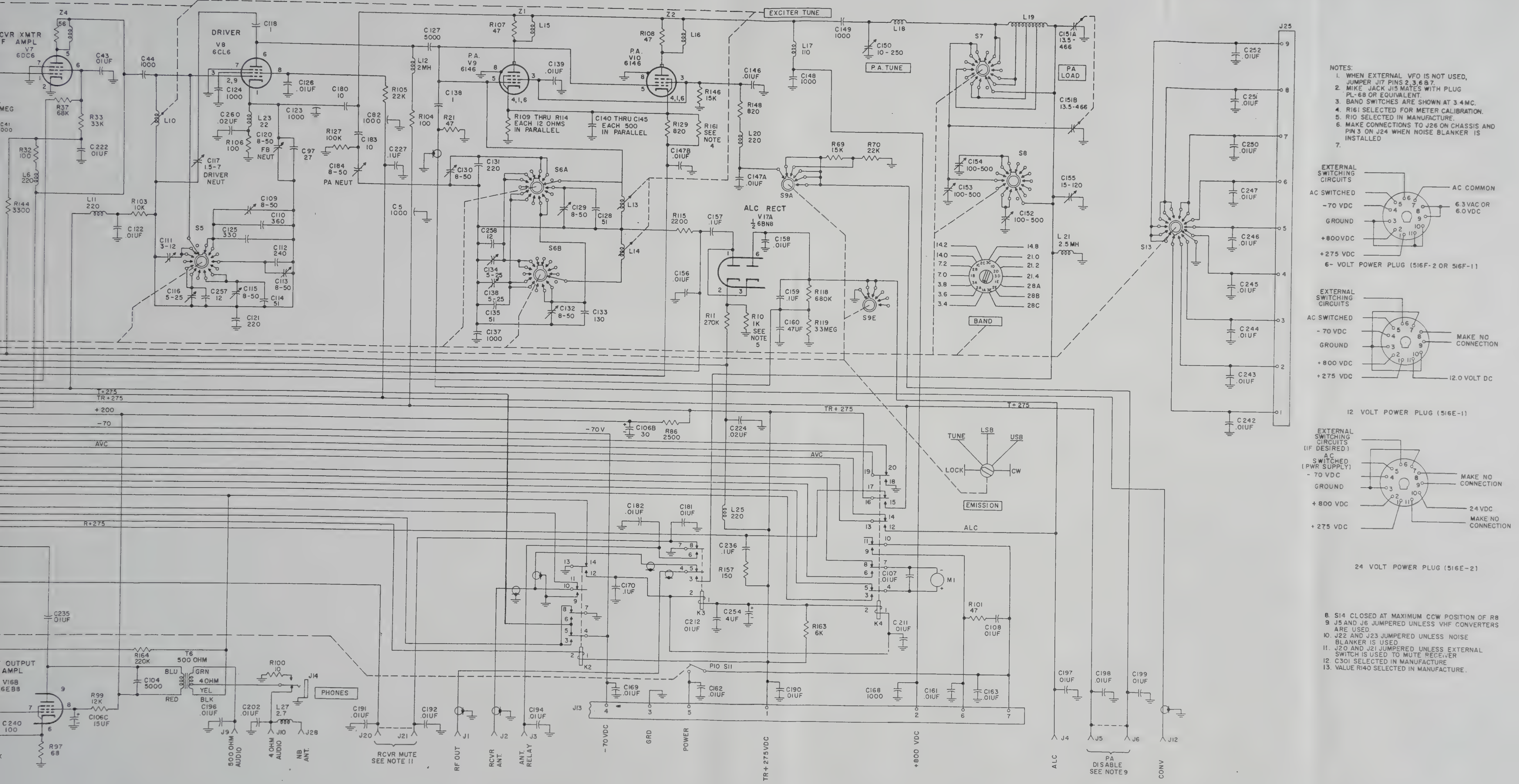

AF
2ND MIC AMPL V11B ½6U8A (TRIODE)
AF
CATH FOL V3A ½6AZ8 (TRIODE)
AF
BAL MOD CR1 AND CR2 (2) 1N34A
455 KC
XMTR IF AMPL V4A ½6AZ8 (PENTODE)
455 KC
MECH FIL FL1 (2.1 KC BANDPASS)
455 KC
1ST XMTR MIXER V5 12AT7
2.955–3.155 MC
VARIABLE IF TUNED CIRCUIT T2 2.955 TO 3.155 MC
2.955–3.155 MC
VARIABLE IF TUNED CIRCUIT L4 2.955 TO 3.155 MC
2.955–3.155 MC
2ND XMTR MIXER V6 12AT7
RCVR XMTR RF AMPLIFIER V7 6DC6
DRIVER V8 6CL6
POWER AMPL V9 AND V10 (2) 6146 (PAR.)
3.4-30.0 MC
XTAL CAL V12A ½6U8A (PENTODE)
3.4-30.0 MC
P/O K2
J2 TO RCVR ANT. (IF USED)
P/O K3
J1 TO ANT.
1350 CPS
TONE OSC V2B ½6U8A (PENTODE)
VOX AMPL V14C ⅓6BN8 (TRIODE)
453.65KC OR 456.35KC
BFO V11A ½6U8A (PENTODE)
ALC FROM V17A
1ST RCVR IF AMPL V1B ½6AZ8 (PENTODE)
AVC
2.5–2.7 MC
6.555–32.655 MC
AVC FROM V15A
3.4-29.7 MC
AF
453.65KC OR 456.35KC
455KC
VFO CATH FOL V2A ½6U8A (TRIODE)
XTAL OSC V13A ½6U8A (PENTODE)
XTAL OSC CATH FOL V12B ½6U8A (TRIODE)
6.555–32.655 MC
RCVR 1ST MIXER V13B ½6U8A (TRIODE)
ALC RECT V17A ½6BN8 (DIODES)
VOX RECT V14B ⅓6BN8 (DIODE)
PRODUCT DETECTOR V15B ½6BJ8 (TRIODE)
455KC
2ND RCVR IF AMPL V3B ½6AZ8 (PENTODE)
AVC
2.5–2.7 MC
2.955–3.155MC
ALC VOLTAGE TO V4A
DC
AF
VFO V301 6AU6
2.5–2.7 MC
RCVR 2ND MIXER V17B ½6BN8 (TRIODE)
RELAY K3
ANTENNA SWITCHING
EXT CKT CONTROL
VOX RELAY AMPL V4B ½6AZ8 (TRIODE)
1ST AF AMPL V16A ½6EB8 (TRIODE)
AVC RECT V15A ½6BJ8 (DIODES)
AVC
−70V DC ON–OFF CONTROL OF XMTR AND RCVR CKT
AVC TO V7
DC
AF
VOX RELAY K2
RELAY K4
METER SWITCHING
EXTERNAL POWER SWITCHING
AVC/ALC SWITCHING
B+ SWITCHING
ANTI VOX RECT V14A ⅓6BN8 (DIODE)
AF
AF OUTPUT AMPL V16B ½6EB8 (PENTODE)
J9 500 OHM AUDIO
J14 PHONES
L27
J10 4 OHM AUDIO
J28 NB ANT.
TRANSMIT SIGNAL
RECEIVE SIGNAL
CONTROL, OSC, AVC, OR ALC
ANTENNA SWITCHING

Figure 3-1. KWM-2 Transceiver, Block Diagram


SEE NOTE 2
J15
MIC
RING
SLEEVE
TIP
C1 .02UF
R1 47K
C2 220
R2 1MEG
1ST MIC AMPL
V1A ½ 6AZ8
R3 180
C225 .1UF
S9C
C3 5000
R4 68K
C214 470
R138 47K
2ND MIC AMPL
V11B ½ 6U8A
R5 470K
C259 8UF
R6 330
R7 47K
C4 5000
R139 47K
CATH FOL
V3A ½ 6AZ8
MIC GAIN
CW
R8 500K
C6 .47UF
R12 1K
C7 .01UF
S14
MIC OFF SEE NOTE 8
C215 470
R128 1MEG
R165 470K
S9D
R156 1.5MEG
BALANCED MODULATOR
C9 5-25
CARR BAL
R14 270
R15 250
R172 82
R16 270
CR1 1N34A
CR2 1N34A
CR3 1N34A
CR4 1N34A
C8 .01UF
C10 33
T1
C171 510
C11 1000
XMTR IF AMPL
V4A ½ 6AZ8
R140 SEE NOTE 13
C12 .01UF
C13 .01UF
R170 220
R30 250
ALC ZERO
R19 47
R17 100K
R18 47K
R141 39K
R150 180
R38 150
C216 .02UF
L2 10MH
C15 1000
C14 100
FL1
2.1KC
C217 220
C218 220
1ST MIXER BAL
L20 39
C16 51
C232 1000
TONE OSC
C52 470
C51 470
R53 33K
C105 470
C50 470
R52 390K
R51 390K
R171 1MEG
V2B ½ 6U8A
R50 47K
R49 100K
C49 .1UF
R135 1K
S9F
S9G
R155 1.5MEG
R39 500K
VOX GAIN
VOX AMPL
V14C ⅓ 6BN8
R40 100K
R41 330
C46 .1UF
R44 270K
VOX RECT
V14B ⅓ 6BN8
R42 8.2 MEG
R43 10MEG
C47 .01UF
ANTI VOX RECT
C48 .02UF
R48 8.2MEG
V14A ⅓ 6BN8
ANTI VOX
R45 500K
C188 .01UF
VOX RELAY AMPL
V4B ½ 6AZ8
R20 68K
R47 68K
R46 2200
BFO
V11A ½ 6U8A
R54 1MEG
C53 22
Y17 456.350
Y16 453.650
S9H
C88 510
L22 220
C55 47
C234 1000
R55 220K
C17 .02UF
R149 1K
R56 5600
C56 .02UF
R57 1K
S12
GRID
ALC
PLATE
R117 1K
R116 18K
7CK-2 OSCILLATOR
L301 2.4
SEE NOTE 12
L302 6-1
L303
C301 20
C305 100
C303 3000
C304 200
C302 1000
R301 100K
V301 6AU6
C308 5-25
R302 82K
C306 .02UF
C309 .02UF
T301
C307 .02UF
C310 .02U
L304 3.3
CR301 1N34A
R30 100K
S9B
R35 100K
R130 100K
R137 82K
EXT VFO POWER
J17
SEE NOTE 1
R73 15K
R131 33K
C204 .01UF
C206 .01UF
C205 .01UF
C209 .01UF
L26 10
C207 .01UF
C208 .01UF
JUMPER PLUG FURNISHED
T+275
TR+275
+200
-70
AVC
R+275
C203 .01UF
C210 .01UF
V2
V12
V301
V4
V3
V1
V6
V11
V16
V15
V14
V5
V17
V13
V7
L29
V8
V9
L34
V10
L30
C167 .01UF
C241 1000
DS1
C164 .01UF
R173 22
DS2
C253 .1UF
C230 1000
C166 .01UF
C228 1000
C229 .01UF
SEE NOTE 6
C201 .01UF
C165 .01UF
J13
SEE NOTE 7 FOR FILAMENT POWER
POWER
J24
NB POWER
J26
SPARE
J16
PTT
J11
PHONE PATCH
J19
6.3VAC
6VDC OR 6VAC
GRD FOR 6 V, HOT FOR 12 V
C193 .01UF
J7
KEY
C60 20
C59 1000
R62 100K
C195 .01UF
R60 100K
J8
RCVR MUTE
RCVR 1ST MIXER
V13B ½ 6U8A
R168 56
R174 56
C61 1000
R61 150
Z5
C58 15
R59 100K
RCVR 2ND MIXER
V17B ⅓ 6BN8
L33 2MH
C23 1000
R58 1K
C186 1000
C83 1000
R74 1MEG
R123 47K
R121 100K
S METER ZERO
R147 82K
R158 100
1ST IF AMPL
V1B ½ 6AZ8
C86 .01UF
R76 47K
R79
R132 1K
RCVR GAIN ADJUST
R75 10
C84 .1UF
C85 .01UF

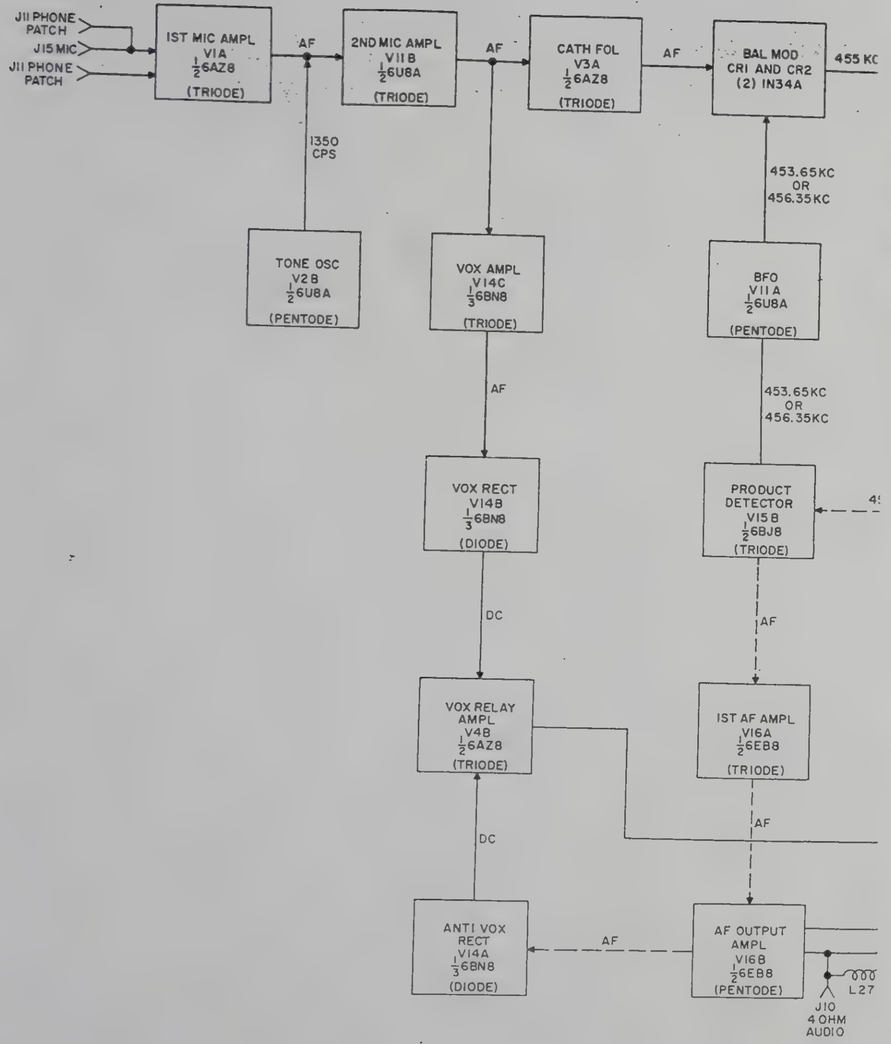

1ST XMTR MIXER
V5 12AT7
1ST MIXER BAL
R23 120
R24 250
R25 120
C18 .01UF
C19 .01UF
C217 220
C219 220
C22 22
C21 5-25
T2
C172 240
C173 240
VIF OUT J22
SEE NOTE 10 JUMPER
VIF IN J23
C220 1000
C25 3
L4
C175 180
C176 510
C26 6
R124 3900
R27 100K
R26 470K
R142 10K
C219 1000
C20 .01UF
2ND XMTR MIXER V6 12AT7
R28 56
R29 220
R30 220
C28 .01UF
R31 100K
C27 1000
C62 1000
C29 .01UF
R136 470K
L5 220
R143 1500
C221 .1UF
C30 10
C31 10
T3
T4
S4
C39 1.5-7
C37 8-50
C38 360
C32 8-50
C33 130
C36 5-25
C34 8-50
C35 22
C40 1000
R9 56
R34 3.3 MEG
C41 1000
RCVR XMTR RF AMPL V7 6DC6
Z4 56
C43 .01UF
R37 68K
R33 33K
R32 100
L6 220
C222 .01UF
R144 3300
L11 220
C122 .01UF
R103 10K
C44 1000
L10
DRIVER V8 6CL6
C118 1
C124 1000
C126 .01UF
C260 .02UF
L23 22
C120 8-50 FB NEUT
R106 100
C97 27
C123 1000
C180 10
C117 1.5-7 DRIVER NEUT
C109 8-50
C110 360
C125 330
C111 3-12
S5
C112 240
C113 8-50
C116 5-25
C257 12
C115 8-50
C114 51
C121 220
C127 5000
L12 2MH
R105 22K
C82 1000
R104 100
R127 100K
C183 10
C184 8-50 PA NEUT
C227 .1UF
C5 1000
R21 47
C138 1
P.A. V9 6146
R107 47
Z1
R109 EACH IN PARA
C130 8-50
C131 220
C258 12
C134 5-25
C136 5-25
C135 51
C137 1000
S2 SEE NOTE 3
12.1775 12.0775 8.9775 8.6775 8.5775 10.355 10.155
Y10 Y9 Y8 Y7 Y6 Y5 Y4
12.2775 15.8275 6.555 6.755 6.955
Y11 Y12 Y13 Y14 Y1 Y2 Y3
XTAL OSC V13A ½ 6U8A
R63 1MEG
R125 47K
C74 47
L7 2MH
C187 1000
S3
C68 8-50
C70 8-50
C69 160
R152 5600
C63 8-50
C64 130
R151 3900
C65 8-50
C66 47
C67 8-50
C71 .01UF
XTAL OSC CATH FOL V12B ½ 6U8
R153 6800
R160 120K
C237 .01UF
C226 1000
R154 100K
R159 1K
XTAL CAL V12A ½ 6U8A
C79 3
C119 2
R66 220K
R67 39K
C75 .01UF
C78 .01UF
R65 1MEG
R64 1K
Y15 100KC
C76 8-50
C77 100
R68 15K
VFO CATH FOL V2A ½ 6U8A
J18 EXTERNAL VFO
R22 56
R16 47
C72 1000
R134 120K
C80 .01UF
R71 100K
C24 5000
R102 1K
C248 500
R72 6800
L35 10
C249 500
L3 2MH
R169 1K
C238 .1UF
C307 .02UF
C309 .02UF
C310 .02UF
R130 100K
R137 82K
T+275
TR+275
+200
-70
AVC
R+275
R78 1MEG
R147 82K
R158 100
R79 39K
R145 47K
C45 1000
J27 Q MULT.
R77 1K
L9
C177 180
C87 100
2ND IF AMPL V38 ½ 6AZ8
C89 .01UF
R120 39K
R80 47K
R81 5600
C90 .1UF
T5
C178 510
C179 510
R82 4700
C91 1000
C92 .01UF
C93 .05UF
R83 3.3 MEG
R133 18K
R84 10K
CW
R.F. GAIN
R126 820
R85 12K
AVC RECT V15A ½ 6BJ8
C94 10
C231 .1UF
R13 1MEG
R93 1MEG
R166 1800
PROD DET V15B ½ 6BJ8
R87 6800
C106A 20UF
R90 27K
R91 47K
C98 470
C96 5000
R88 820
C256 5000
L31 2MH
C100 5000
C99 470
R92 500K
CW
A.F. GAIN
C101 .1UF
C223 470
OFF ON NB CAL
S11
R96 220K
1ST AF AMPL V16A ½ 6EB8
C103 5000
R94 2.2 MEG
C102 100UF
R95 5600
R98 470K
C233 .1UF
R89 220K
C235 .01UF
AF OUTPUT AMPL V16B ½ 6EB8
C240 100
R97 68
R99 12K
C106C 15UF
R164 220K
T6 500 OHM
BLU GRN 4 OHM YEL RED BLK
C104 5000
C196 .01UF
C202 .01UF
R100 10
J14 PHONES
L27 2.7
J9 500 OHM AUDIO
J10 4 OHM AUDIO
J28 NB ANT.
C191 .01UF
J20
J21
C192 .01UF
RCVR MUTE SEE NOTE 11
J1 RF OUT
J2 RCVR ANT.
ANT. RELAY

SECTION VII
ILLUSTRATIONS



NOTES:
1. WHEN EXTERNAL VFO IS NOT USED, JUMPER J17 PINS 2,3,6 & 7.
2. MIKE JACK J15 MATES WITH PLUG PL-68 OR EQUIVALENT.
3. BAND SWITCHES ARE SHOWN AT 3.4MC.
4. R161 SELECTED FOR METER CALIBRATION.
5. R10 SELECTED IN MANUFACTURE.
6. MAKE CONNECTIONS TO J26 ON CHASSIS AND PIN 3 ON J24 WHEN NOISE BLANKER IS INSTALLED
7.
8. S14 CLOSED AT MAXIMUM CCW POSITION OF R8
9. J5 AND J6 JUMPERED UNLESS VHF CONVERTERS ARE USED.
10. J22 AND J23 JUMPERED UNLESS NOISE BLANKER IS USED
11. J20 AND J21 JUMPERED UNLESS EXTERNAL SWITCH IS USED TO MUTE RECEIVER
12. C301 SELECTED IN MANUFACTURE
13. VALUE R140 SELECTED IN MANUFACTURE.

Figure 7-1. KWM-2 Transceiver, Schematic Diagram


J11 PHONE PATCH
J15 MIC
J11 PHONE PATCH
1ST MIC AMPL V1A ½6AZ8 (TRIODE)
AF
2ND MIC AMPL V11B ½6U8A (TRIODE)
CATH FOL V3A ½6AZ8 (TRIODE)
BAL MOD CR1 AND CR2 (2) IN34A
455 KC
1350 CPS
TONE OSC V2B ½6U8A (PENTODE)
VOX AMPL V14C ⅓6BN8 (TRIODE)
453.65KC OR 456.35KC
BFO V11A ½6U8A (PENTODE)
VOX RECT V14B ⅓6BN8 (DIODE)
DC
PRODUCT DETECTOR V15B ½6BJ8 (TRIODE)
VOX RELAY AMPL V4B ½6AZ8 (TRIODE)
1ST AF AMPL V16A ½6EB8 (TRIODE)
ANTI VOX RECT V14A ⅓6BN8 (DIODE)
AF OUTPUT AMPL V16B ½6EB8 (PENTODE)
J10 4 OHM AUDIO
L27

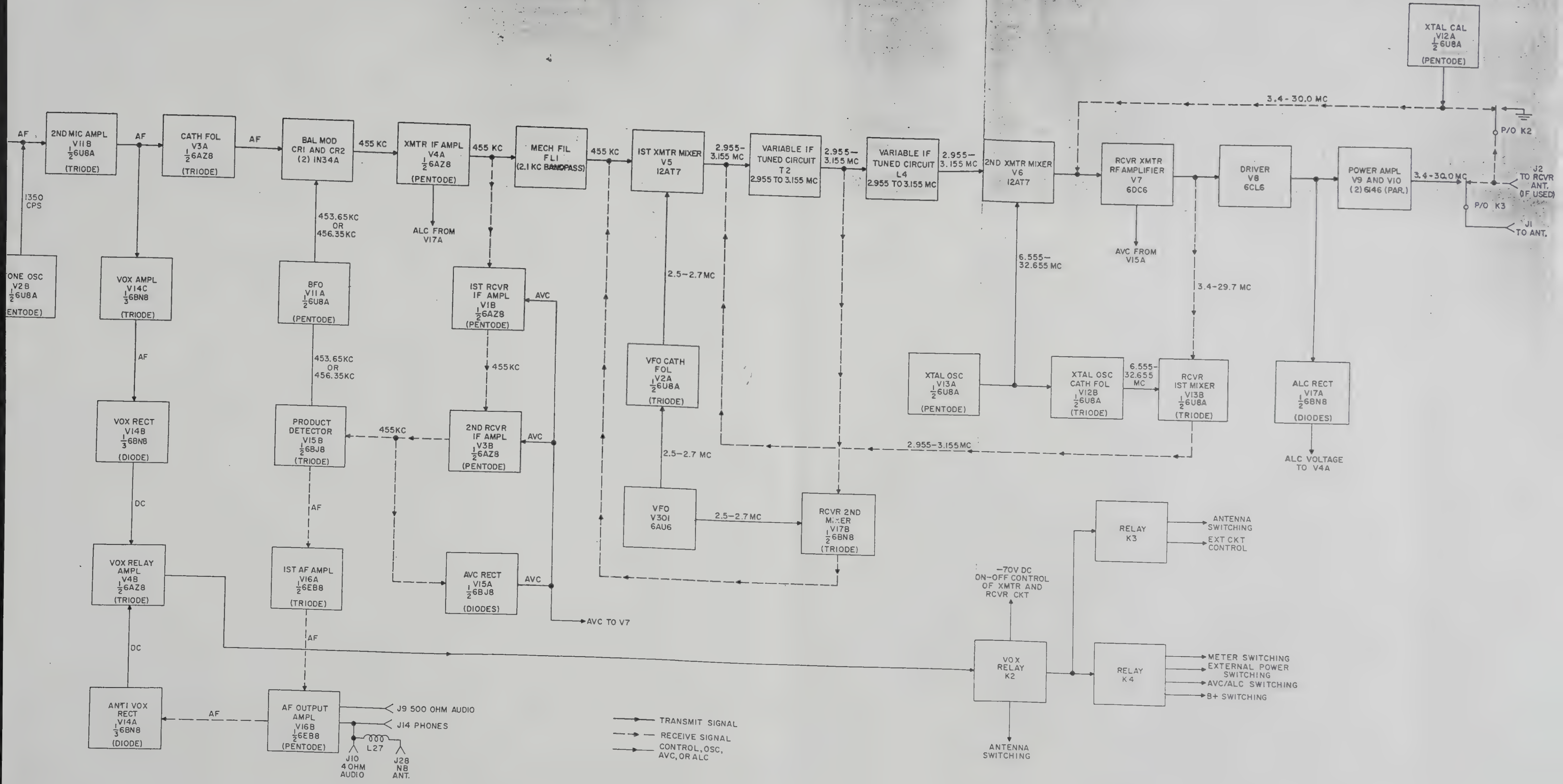
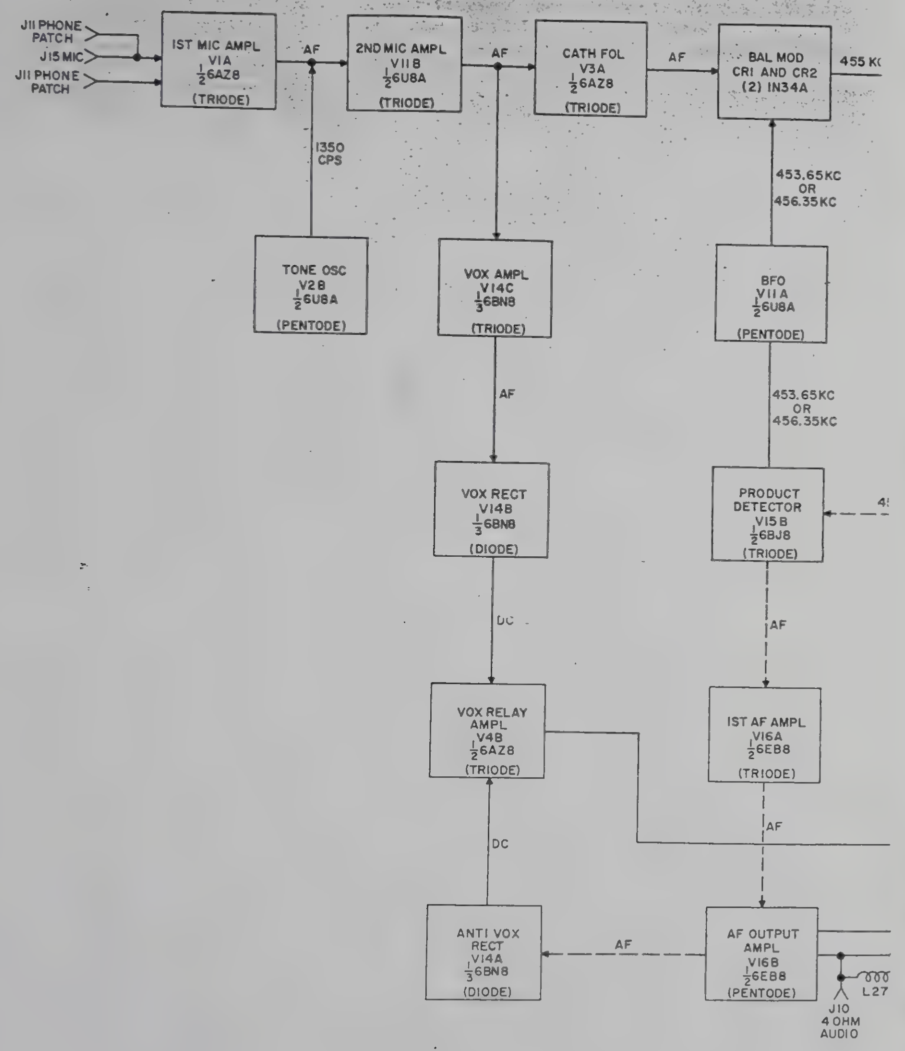

AF
2ND MIC AMPL V11B ½6U8A (TRIODE)
CATH FOL V3A ½6AZ8 (TRIODE)
BAL MOD CR1 AND CR2 (2) IN34A
455 KC
XMTR IF AMPL V4A ½6AZ8 (PENTODE)
MECH FIL FL1 (2.1 KC BANDPASS)
1ST XMTR MIXER V5 12AT7
2.955-3.155 MC
VARIABLE IF TUNED CIRCUIT T2 2.955 TO 3.155 MC
VARIABLE IF TUNED CIRCUIT L4 2.955 TO 3.155 MC
2ND XMTR MIXER V6 12AT7
RCVR XMTR RF AMPLIFIER V7 6DC6
DRIVER V8 6CL6
POWER AMPL V9 AND V10 (2) 6146 (PAR.)
3.4-30.0 MC
XTAL CAL V12A ½6U8A (PENTODE)
P/O K2
J2 TO RCVR ANT. (IF USED)
P/O K3
J1 TO ANT.
1350 CPS
TONE OSC V2B ½6U8A (PENTODE)
VOX AMPL V14C ⅓6BN8 (TRIODE)
453.65KC OR 456.35KC
BFO V11A ½6U8A (PENTODE)
ALC FROM V17A
1ST RCVR IF AMPL V1B ½6AZ8 (PENTODE)
AVC
455KC
2.5-2.7 MC
VFO CATH FOL V2A ½6U8A (TRIODE)
6.555-32.655 MC
AVC FROM V15A
3.4-29.7 MC
XTAL OSC V13A ½6U8A (PENTODE)
XTAL OSC CATH FOL V12B ½6U8A (TRIODE)
RCVR 1ST MIXER V13B ½6U8A (TRIODE)
ALC RECT V17A ½6BN8 (DIODES)
ALC VOLTAGE TO V4A
VOX RECT V14B ⅓6BN8 (DIODE)
PRODUCT DETECTOR V15B ½6BJ8 (TRIODE)
2ND RCVR IF AMPL V3B ½6AZ8 (PENTODE)
2.955-3.155 MC
VFO V301 6AU6
RCVR 2ND MIXER V17B ½6BN8 (TRIODE)
DC
AF
VOX RELAY AMPL V4B ½6AZ8 (TRIODE)
1ST AF AMPL V16A ½6EB8 (TRIODE)
AVC RECT V15A ½6BJ8 (DIODES)
AVC TO V7
RELAY K3
ANTENNA SWITCHING
EXT CKT CONTROL
-70V DC ON-OFF CONTROL OF XMTR AND RCVR CKT
VOX RELAY K2
RELAY K4
METER SWITCHING
EXTERNAL POWER SWITCHING
AVC/ALC SWITCHING
B+ SWITCHING
ANTENNA SWITCHING
ANTI VOX RECT V14A ⅓6BN8 (DIODE)
AF OUTPUT AMPL V16B ½6EB8 (PENTODE)
J9 500 OHM AUDIO
J14 PHONES
L27
J10 4 OHM AUDIO
J28 NB ANT.
TRANSMIT SIGNAL
RECEIVE SIGNAL
CONTROL, OSC, AVC, OR ALC

Figure 3-1. KWM-2 Transceiver, Block Diagram


J11 PHONE PATCH
J15 MIC
J11 PHONE PATCH
1ST MIC AMPL V1A ½ 6AZ8 (TRIODE)
AF
2ND MIC AMPL V11B ½ 6U8A (TRIODE)
AF
CATH FOL V3A ½ 6AZ8 (TRIODE)
AF
BAL MOD CR1 AND CR2 (2) 1N34A
1350 CPS
TONE OSC V28 ½ 6U8A (PENTODE)
VOX AMPL V14C ⅓ 6BN8 (TRIODE)
AF
VOX RECT V14B ⅓ 6BN8 (DIODE)
DC
VOX RELAY AMPL V4B ½ 6AZ8 (TRIODE)
DC
ANTI VOX RECT V14A ⅓ 6BN8 (DIODE)
AF
453.65KC OR 456.35KC
BFO V11A ½ 6U8A (PENTODE)
453.65KC OR 456.35KC
PRODUCT DETECTOR V15B ½ 6BJ8 (TRIODE)
AF
1ST AF AMPL V16A ½ 6EB8 (TRIODE)
AF
AF OUTPUT AMPL V16B ½ 6EB8 (PENTODE)
L27
J10 4 OHM AUDIO

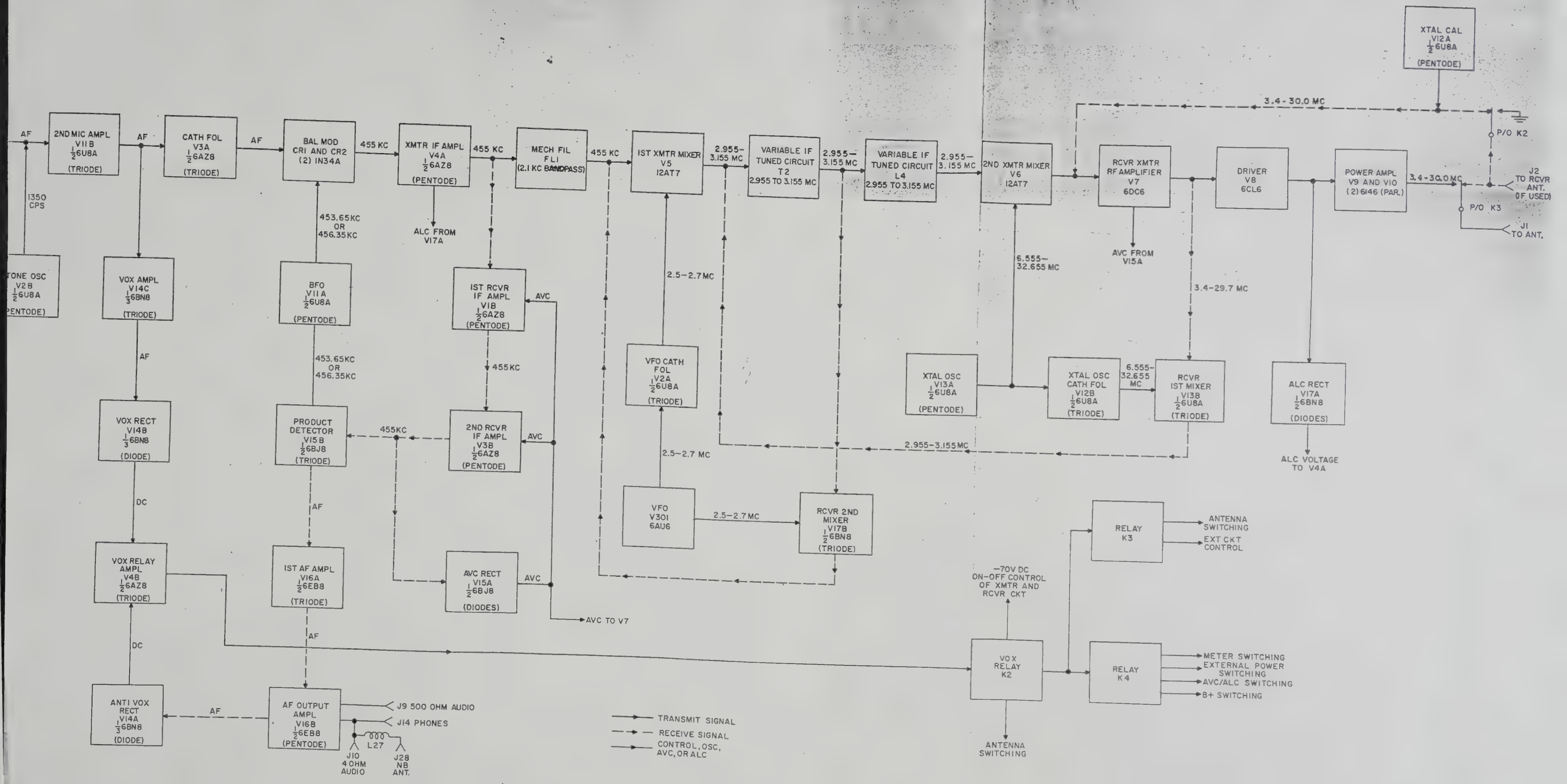
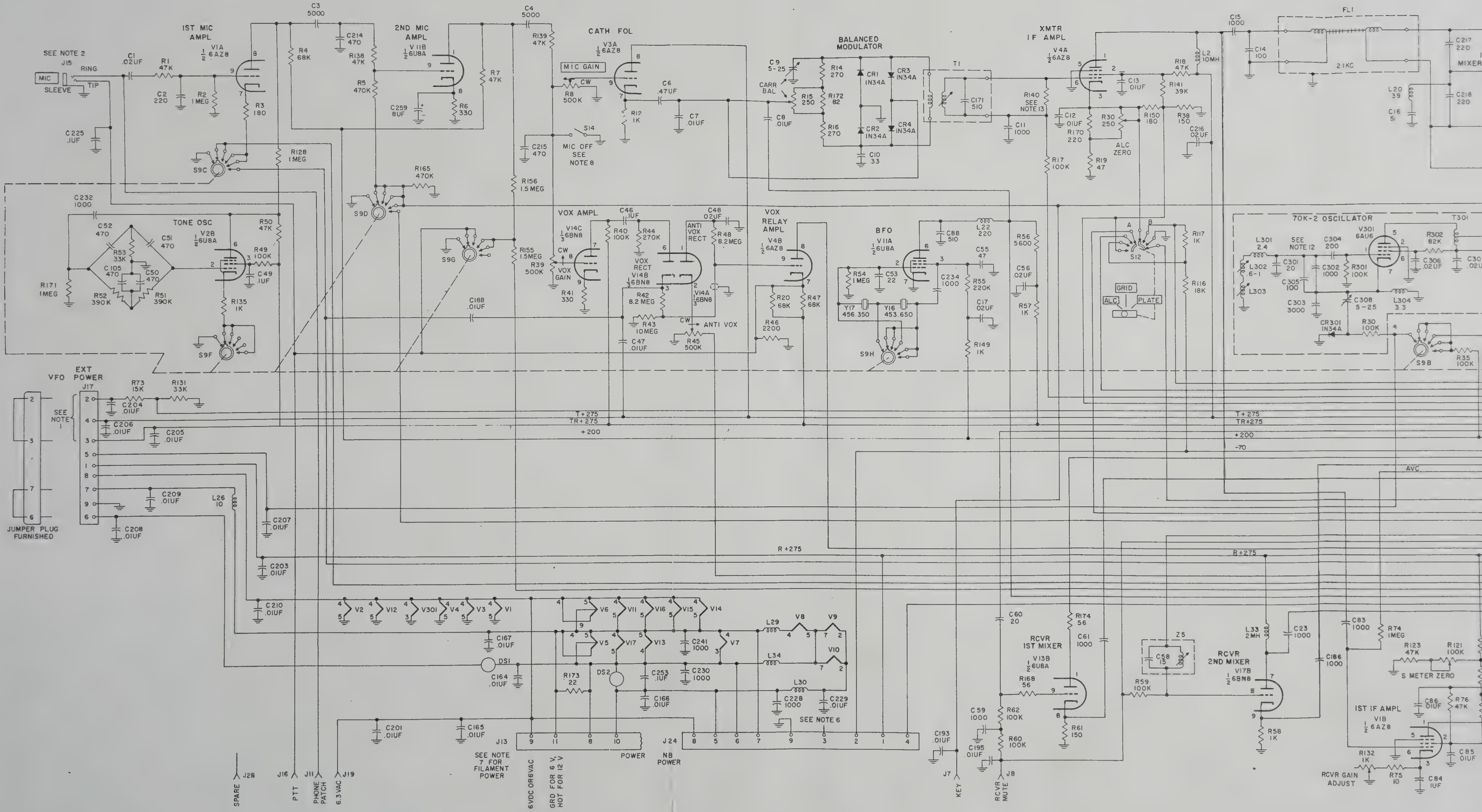
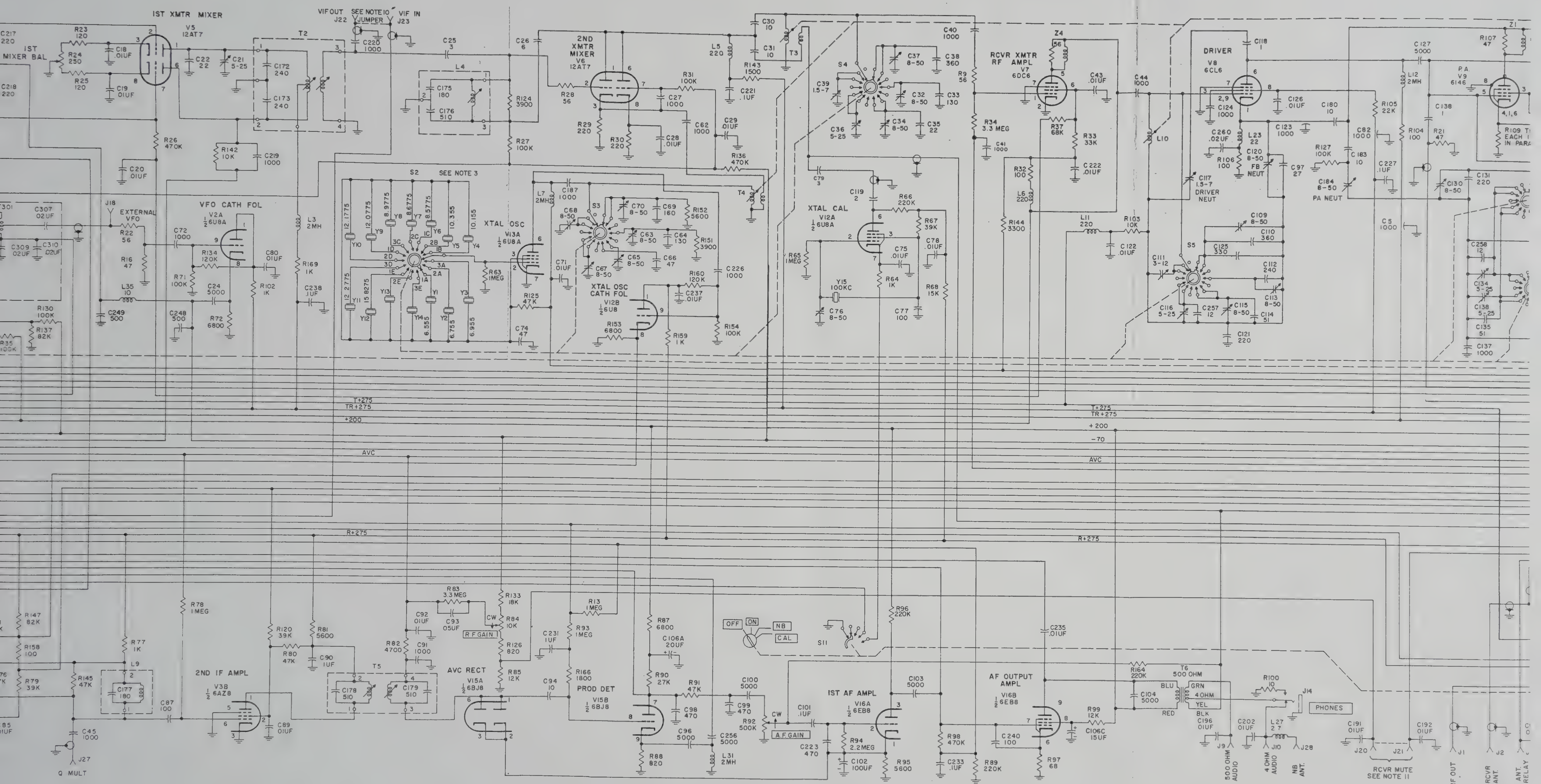

AF
2ND MIC AMPL V11B ½ 6U8A (TRIODE)
AF
CATH FOL V3A ½ 6AZ8 (TRIODE)
AF
BAL MOD CR1 AND CR2 (2) 1N34A
455 KC
XMTR IF AMPL V4A ½ 6AZ8 (PENTODE)
455 KC
MECH FIL FL1 (2.1 KC BANDPASS)
455 KC
1ST XMTR MIXER V5 12AT7
2.955-3.155 MC
VARIABLE IF TUNED CIRCUIT T2 2.955 TO 3.155 MC
2.955-3.155 MC
VARIABLE IF TUNED CIRCUIT L4 2.955 TO 3.155 MC
2.955-3.155 MC
2ND XMTR MIXER V6 12AT7
RCVR XMTR RF AMPLIFIER V7 6DC6
DRIVER V8 6CL6
POWER AMPL V9 AND V10 (2) 6146 (PAR.)
3.4-30.0 MC
J2 TO RCVR ANT. (IF USED)
P/O K2
P/O K3
J1 TO ANT.
XTAL CAL V12A ½ 6U8A (PENTODE)
3.4-30.0 MC
1350 CPS
TONE OSC V28 ½ 6U8A (PENTODE)
VOX AMPL V14C ⅓ 6BN8 (TRIODE)
AF
VOX RECT V14B ⅓ 6BN8 (DIODE)
DC
VOX RELAY AMPL V4B ½ 6AZ8 (TRIODE)
DC
ANTI VOX RECT V14A ⅓ 6BN8 (DIODE)
AF
453.65KC OR 456.35KC
BFO V11A ½ 6U8A (PENTODE)
453.65KC OR 456.35KC
PRODUCT DETECTOR V15B ½ 6BJ8 (TRIODE)
AF
1ST AF AMPL V16A ½ 6EB8 (TRIODE)
AF
AF OUTPUT AMPL V16B ½ 6EB8 (PENTODE)
J9 500 OHM AUDIO
J14 PHONES
J10 4 OHM AUDIO
L27
J28 NB ANT.
ALC FROM V17A
1ST RCVR IF AMPL V1B ½ 6AZ8 (PENTODE)
AVC
455KC
2ND RCVR IF AMPL V3B ½ 6AZ8 (PENTODE)
AVC
455KC
AVC RECT V15A ½ 6BJ8 (DIODES)
AVC
AVC TO V7
2.5-2.7 MC
VFO CATH FOL V2A ½ 6U8A (TRIODE)
2.5-2.7 MC
VFO V301 6AU6
2.5-2.7 MC
RCVR 2ND MIXER V17B ½ 6BN8 (TRIODE)
6.555-32.655 MC
XTAL OSC V13A ½ 6U8A (PENTODE)
XTAL OSC CATH FOL V12B ½ 6U8A (TRIODE)
6.555-32.655 MC
RCVR 1ST MIXER V13B ½ 6U8A (TRIODE)
3.4-29.7 MC
AVC FROM V15A
2.955-3.155 MC
ALC RECT V17A ½ 6BN8 (DIODES)
ALC VOLTAGE TO V4A
RELAY K3
ANTENNA SWITCHING
EXT CKT CONTROL
-70V DC ON-OFF CONTROL OF XMTR AND RCVR CKT
VOX RELAY K2
ANTENNA SWITCHING
RELAY K4
METER SWITCHING
EXTERNAL POWER SWITCHING
AVC/ALC SWITCHING
B+ SWITCHING
TRANSMIT SIGNAL
RECEIVE SIGNAL
CONTROL, OSC, AVC, OR ALC

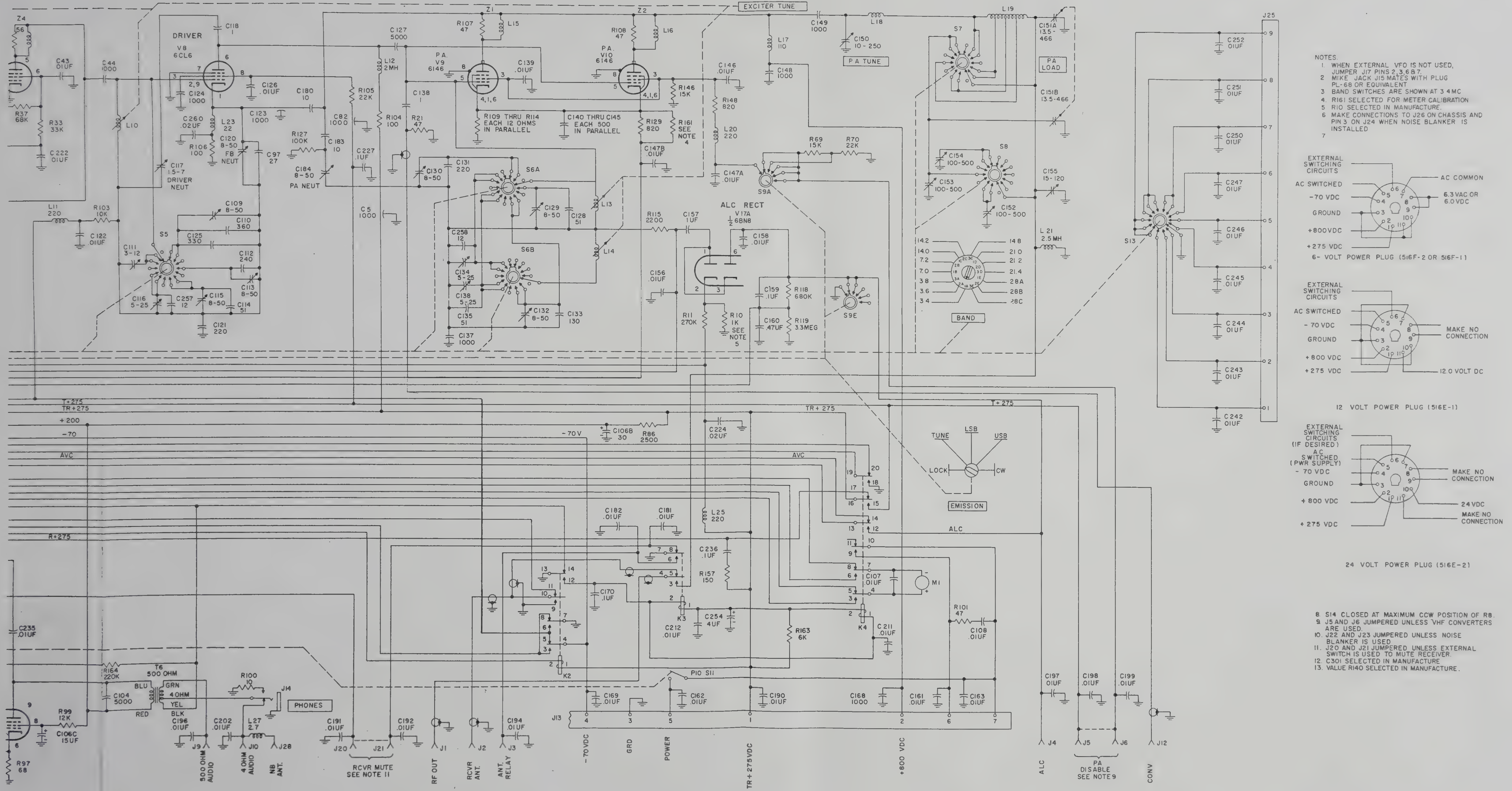
Figure 3-1. KWM-2 Transceiver, Block Diagram


SEE NOTE 2
J15
RING
MIC
SLEEVE
TIP
C1 .02UF
R1 47K
C2 220
R2 1MEG
1ST MIC AMPL
½ V1A 6AZ8
R3 180
C225 .1UF
S9C
R128 1MEG
C3 5000
R4 68K
C214 470
R138 47K
R5 470K
2ND MIC AMPL
½ V11B 6U8A
C259 8UF
R6 330
R7 47K
R165 470K
S9D
S9G
C4 5000
R139 47K
CATH FOL
½ V3A 6AZ8
MIC GAIN
R8 500K
CW
C6 47UF
R12 1K
C7 .01UF
S14
MIC OFF SEE NOTE 8
C215 470
R156 1.5MEG
R155 1.5MEG
R39 500K
C232 1000
TONE OSC
½ V2B 6U8A
C52 470
C51 470
R53 33K
C105 470
C50 470
R52 390K
R51 390K
R171 1MEG
R50 47K
R49 100K
C49 .1UF
R135 1K
S9F
C188 .01UF
VOX AMPL
⅓ V14C 6BN8
CW
VOX GAIN
R41 330
C46 .1UF
R40 100K
R44 270K
VOX RECT
⅓ V14B 6BN8
R42 8.2 MEG
R43 10MEG
C47 .01UF
R45 500K
ANTI VOX
ANTI VOX RECT
⅓ V14A 6BN8
C48 .02UF
R48 8.2MEG
VOX RELAY AMPL
½ V4B 6AZ8
R20 68K
R47 68K
R46 2200
BALANCED MODULATOR
C9 5-25
CARR BAL
R15 250
R14 270
R172 82
R16 270
C8 .01UF
CR1 1N34A
CR3 1N34A
CR2 1N34A
CR4 1N34A
C10 33
T1
C171 510
BFO
½ V11A 6U8A
R54 1MEG
C53 22
C88 510
L22 220
C55 47
C234 1000
R55 220K
C17 .02UF
R149 1K
Y17 456.350
Y16 453.650
S9H
XMTR IF AMPL
½ V4A 6AZ8
R140 SEE NOTE 13
C11 1000
C12 .01UF
R170 220
R17 100K
R19 47
C13 .01UF
R30 250
ALC ZERO
R150 180
R18 47K
R141 39K
R38 150
L2 10MH
C216 .02UF
R56 5600
C56 .02UF
R57 1K
S12
A
B
GRID
ALC
PLATE
R117 1K
R116 18K
C15 1000
C14 100
FL1
2.1KC
C217 220
C218 220
MIXER
L20 39
C16 51
70K-2 OSCILLATOR
L301 2.4
SEE NOTE 12
C304 200
V301 6AU6
R302 82K
T301
L302 .6-1
C301 20
C302 1000
R301 100K
C306 .02UF
C305 100
L303
C303 3000
C308 5-25
L304 3.3
CR301 1N34A
R30 100K
S9B
R35 100K
VFO
EXT POWER
J17
SEE NOTE 1
R73 15K
R131 33K
C204 .01UF
C206 .01UF
C205 .01UF
C209 .01UF
L26 10
C207 .01UF
C208 .01UF
JUMPER PLUG FURNISHED
C203 .01UF
C210 .01UF
T+275
TR+275
+200
-70
AVC
R+275
V2
V12
V301
V4
V3
V1
V6
V11
V16
V15
V14
V5
V17
V13
V7
C241 1000
L29
V8
V9
L34
V10
L30
C167 .01UF
DS1
C164 .01UF
R173 22
DS2
C253 .1UF
C230 1000
C166 .01UF
C228 1000
C229 .01UF
SEE NOTE 6
C201 .01UF
C165 .01UF
J13
SEE NOTE 7 FOR FILAMENT POWER
POWER
J24
NB POWER
J25
SPARE
J16
PTT
J11
PHONE PATCH
J19
6.3VAC
6VDC OR 6VAC
GRD FOR 6 V, HOT FOR 12 V
C193 .01UF
J7
KEY
C60 20
C59 1000
C195 .01UF
R62 100K
R60 100K
J8
RCVR MUTE
RCVR 1ST MIXER
½ V13B 6U8A
R168 56
R174 56
C61 1000
R61 150
Z5
C58 15
R59 100K
RCVR 2ND MIXER
½ V17B 6BN8
L33 2MH
C23 1000
R58 1K
C186 1000
C83 1000
R74 1MEG
R123 47K
R121 100K
S METER ZERO
1ST IF AMPL
½ V1B 6AZ8
C86 .01UF
R76 47K
R132 1K
RCVR GAIN ADJUST
R75 10
C84 .1UF
C85 .01UF



IST XMTR MIXER
V5 12AT7
IST MIXER BAL
VIF OUT J22
SEE NOTE 10 JUMPER
VIF IN J23
T2
C25 3
L4
C26 6
2ND XMTR MIXER V6 12AT7
L5 220
T3
S4
RCVR XMTR RF AMPL V7 6DC6
Z4
DRIVER V8 6CL6
PA V9 6146
Z1
VFO CATH FOL V2A ½ 6U8A
EXTERNAL VFO J18
S2
SEE NOTE 3
XTAL OSC V13A ½ 6U8A
S3
XTAL OSC CATH FOL V12B ½ 6U8
T4
XTAL CAL V12A ½ 6U8A
Y15 100KC
L10
C117 1.5-7 DRIVER NEUT
C120 8-50 FB NEUT
C184 8-50 PA NEUT
S5
T+275
TR+275
+200
AVC
R+275
-70
2ND IF AMPL V3B ½ 6AZ8
T5
AVC RECT V15A ½ 6BJ8
PROD DET V15B ½ 6BJ8
R.F.GAIN
CW
OFF
ON
NB
CAL
S11
IST AF AMPL V16A ½ 6EB8
A.F.GAIN
AF OUTPUT AMPL V16B ½ 6EB8
T6 500 OHM
BLU
GRN
4 OHM
YEL
BLK
RED
J14
PHONES
Q MULT J27
500 OHM AUDIO J9
4 OHM AUDIO J10
NB ANT. J28
RCVR MUTE SEE NOTE 11 J20 J21
RF OUT J1
RCVR ANT. J2
ANT. RELAY

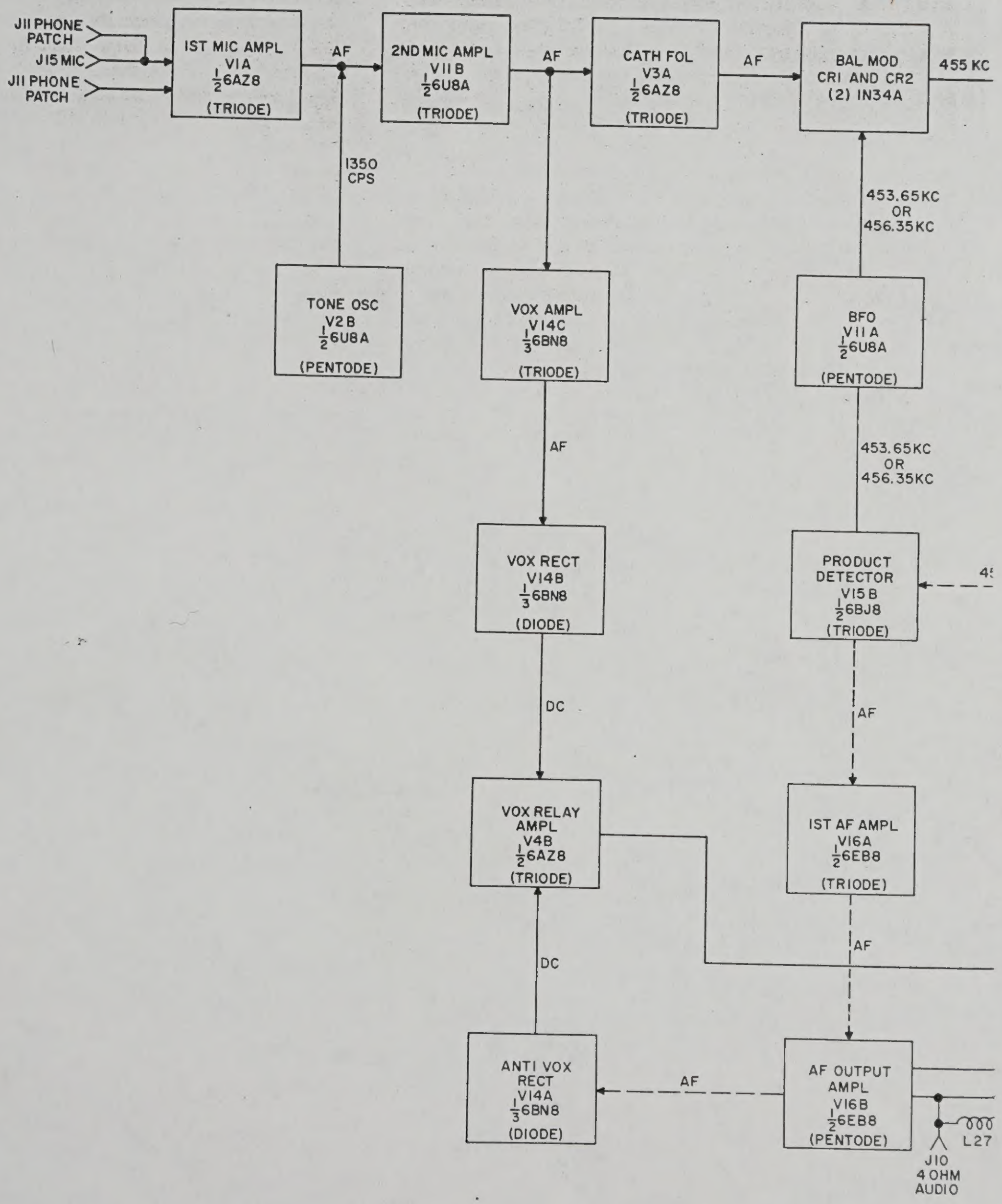
SECTION VII
ILLUSTRATIONS



NOTES.

1. WHEN EXTERNAL VFO IS NOT USED, JUMPER J17 PINS 2,3,6 & 7.
2. MIKE JACK J15 MATES WITH PLUG PL-68 OR EQUIVALENT
3. BAND SWITCHES ARE SHOWN AT 3.4 MC
4. R161 SELECTED FOR METER CALIBRATION
5. R10 SELECTED IN MANUFACTURE.
6. MAKE CONNECTIONS TO J26 ON CHASSIS AND PIN 3 ON J24 WHEN NOISE BLANKER IS INSTALLED
7.
8. S14 CLOSED AT MAXIMUM CCW POSITION OF R8.
9. J5 AND J6 JUMPERED UNLESS VHF CONVERTERS ARE USED.
10. J22 AND J23 JUMPERED UNLESS NOISE BLANKER IS USED
11. J20 AND J21 JUMPERED UNLESS EXTERNAL SWITCH IS USED TO MUTE RECEIVER.
12. C301 SELECTED IN MANUFACTURE
13. VALUE R140 SELECTED IN MANUFACTURE.

Figure 7-1. KWM-2 Transceiver, Schematic Diagram


J11 PHONE PATCH
J15 MIC
J11 PHONE PATCH
1ST MIC AMPL V1A ½6AZ8 (TRIODE)
AF
2ND MIC AMPL V11B ½6U8A (TRIODE)
AF
CATH FOL V3A ½6AZ8 (TRIODE)
AF
BAL MOD CR1 AND CR2 (2) IN34A
455 KC
1350 CPS
TONE OSC V2B ½6U8A (PENTODE)
VOX AMPL V14C ⅓6BN8 (TRIODE)
453.65KC OR 456.35KC
BFO V11A ½6U8A (PENTODE)
AF
453.65KC OR 456.35KC
VOX RECT V14B ⅓6BN8 (DIODE)
PRODUCT DETECTOR V15B ½6BJ8 (TRIODE)
4
DC
AF
VOX RELAY AMPL V4B ½6AZ8 (TRIODE)
1ST AF AMPL V16A ½6EB8 (TRIODE)
AF
DC
ANTI VOX RECT V14A ⅓6BN8 (DIODE)
AF
AF OUTPUT AMPL V16B ½6EB8 (PENTODE)
L27
J10 4 OHM AUDIO

ADDENDUM

KWM-2 TRANSCEIVER INSTRUCTION BOOK (Second Edition)

Mark the following changes in your KWM-2 Instruction Book.

1. Page iv. Figure 1-1. Under power cable from 516F-2 to KWM-2, write -- CAUTION. See Note 11. Add to notes: 11. Be sure to plug 516F-2 into KWM-2 BEFORE plugging 516F-2 into a-c line.

2. Page 1. Change paragraph 1.3 to read:
Set MIC GAIN control (4) full counterclockwise until the switch clicks. Set OFF-ON-NB-CAL switch (1) to ON. Set meter switch (8) to PLATE position, and EMISSION switch (2) to LOCK. The transceiver is in receive condition during warmup, so the meter will read full scale until filaments have come to temperature. This is normal S-meter action. When the S-meter falls back to zero, the circuits will have switched to transmit condition, and the meter will indicate PA plate current. Read the no-signal PA plate current. It should be approximately 40 ma. If plate current is other than 40 ma, adjust BIAS ADJUST potentiometer on top rear of power supply chassis to set plate current to 40 ma.

3. Page 2. Figure 1-2. Add after note 1: CAUTION - Be sure KWM-2 is connected to 516F-2 BEFORE any a-c power is applied.

4. Page 4. Paragraph 2.1, step g. Change first sentence to read: Adjust the EXCITER TUNING control (6) to white portion of scale indicating the desired band. Rock this control slightly to peak the receiver noise output.

5. Page 5. Paragraph 2.2.1. Delete last sentence of step d. Paragraph 2.2.3. Move step e to first step of procedure and change to read: a. Set the function switch (1) to ON.

6. Page 17. Change paragraph 4.5.1.3 to read:

4.5.1.3 BAND-PASS I-F ALIGNMENT.

a. Turn on KWM-2. Set EMISSION switch to TUNE. Tune and load KWM-2 into a dummy load at 14.3 mc. Switch meter to GRID position.

b. Make a swamping tool by connecting a 1000-ohm resistor and a 0.01-uf capacitor in series and connecting clips to their free pigtails. Connect this swamping tool across terminal 3 (secondary winding) of T2 to ground. This terminal is connected to the T2 end of coupling capacitor C25.

c. Keep grid current to approximately mid-scale or lower by adjusting MIC GAIN control, and peak the primary of T2 with tuning tool such as Walsco 2543. The primary slug for T2 is at the bottom of the can. Use grid current as peak indication.

d. Remove the swamping tool from the secondary of T2, and connect it across the primary of T2 (between pins 1 and 6 of the first mixer, V5). Peak the secondary of T2 (slug at top of shield can). Remove the swamping tool.

e. Retune and reload the KWM-2 to 14.255 mc. Without swamping any of the tuned circuits, peak L4 for grid current indication.